FDI-TRADE INTERLINKAGES: ANALYZING IMPACT OF MACROECONOMIC CRISES

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ABSTRACT

FDI-trade interlinkages have become increasingly important in a world operated by Global Value Chains(GVCs) and run by the Multi-National Enterprises(MNEs). The advent of a macroeconomic crisis, which are also more highly transmitted across countries due to these GVCs present a unique challenge- with an increase in uncertainty and its influence over the decisions of MNEs. The present study analyzes FDI and trade flows between the developing countries of BRICS and the developed OECD countries over the period 1986-2013, covering three macroeconomic crises. Focusing on the Global Financial Crisis of 2008, the positive relationship between FDI and trade flows seem to dampen. Furthermore, this adverse impact is more severe when considering flows from the BRICS to OECD countries than vice-versa. However, this dampening effect is short-lived and becomes statistically insignificant 3 years post crisis.

BIOGRAPHICAL SKETCH

Ishneet Kaur is currently a graduate student at the Dyson School in Cornell University. She will graduate in August 2017 with a Master of Science degree in Applied Economics and Management and a focus in International Economics. In the short term, Ms. Kaur looks forward to beginning work with the Risk Advanced Analytics team at McKinsey & Company which would give her an opportunity to utilize and further her skills in data analytics embedded in macroeconomic problem solving.

This work is dedicated to my parents and my sister for having an immense role in shaping my personality and my capabilities. Their unconditional support and encouragement has been a constant source of strength and this work is only a case in point.

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I'm greatly indebted to my advisor, Professor Nancy Chau. Not only has she been an incredible mentor, guiding and streamlining my interests into an interesting research topic; but has also been someone to care for my personal goals. From the very beginning, she has been a source of motivation and has pushed me into digging a little deeper in all aspects of life. She's responsible not only for my academic acumen but for my personal development.

I am thankful to Professor Eswar Prasad for his comments and views at each stage of the thesis process. He has elevated the rigor of this work and recommended exhilarating future paradigms to it.

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Impact of a Macroeconomic Crisis on the FDI-Trade Nexus

I. INTRODUCTION

The purpose of this study is to analyze the impact of a macroeconomic crisis on the interlinkages between Foreign Direct Investment (FDI) and trade flows between countries. The relationship between trade and FDI is the mainstay consideration as these have been important drivers of economic growth, technology transfer, human capital formation, and have facilitated the disbursement of the production process as per the comparative advantages of countries. The dominant role played by the Global Value Chains (GVCs) in today's world has increased the intensity with which the FDI and trade flows are connected and thereupon dependent on each other. This paper takes episodes of macroeconomic crises under the lens because they are periods of uncertainty and bleak economic performance that represent a unique challenge for the policymakers.

The nexus between FDI and trade flows have been crucial in the multi-national enterprise(MNE) shaped highly-globalized world of today. UNCTAD, 2013 report on GVCs and Development establishes trade and FDI flows to be inextricably intertwined due to the functioning of GVCs undertaken by MNEs. It also estimates that MNE-led investment in productive assets and cross-country trade in intermediate inputs and finished outputs account for 80 percent of global trade. Agiomirgianakis et al. (2003) opines that FDI is regarded as the investment flows resultant of the behavior of MNEs. Hence, the factors that influence the behavior of MNEs may also affect the magnitude and the direction of FDI (Demirhan and Masca, 2008). This means that any macroeconomic shock is bound to change the magnitude and direction of FDI. The workings of

the GVCs, moreover, have impacted the magnitude and global transmission of these shocks (Ferrantino and Taglioni, 2014).

The ubiquitous presence of MNEs have been possible as they face lower underlying transaction costs (Hennart, 2000), wherein the transaction costs refers to all the costs which are not accounted for in the financial price of the product or service and constitute of information, bargaining and policing costs, which are discussed in detail later in the paper. The paper argues that the bilateral trade flows between the sample countries have embedded in them these transaction costs, which reduce with increase in bilateral trade, thereby increasing cross-border FDI flows. And during macroeconomic crises, it is the rise in these transaction costs that leads to a fall in the positive impact of trade flows on FDI. The underlying motive of this paper is to contribute to the effort towards understanding the consequential mechanics of such crises on investment and trade relationships between countries.

FDI is considered as the dependent variable for it has important consequences for the participating countries. FDI is beneficial both for the host country as well as investors. While for the host country, the FDI is a source of capital and resources which may not be available otherwise, and for the investing country as it provides an opportunity to seek the highest rate of return (Hill,2000). The World Bank characterizes FDI as being a cross-border investment which gives the investors some degree of ownership or influence in the activity of the enterprise. The IMF regards FDI as an important source of external finance that is motivated by the possibility of earning long-term profits from enterprises residing in another country. (Kastrati, 2013) summarizes that FDI facilitates economic growth in host countries through the following channels:

(a) Transfer of Resources – FDI is a source of capital, technology and managerial capacity leading to economic growth (Hill,2000).

Capital: This is crucial for developing countries, as the Multi-National Enterprises (MNEs) may have better access than the firms in these countries due to the economic size, internal resources, and/or reputation. Moreover, evidence suggests that FDI is correlated with increasing domestic investment (Jenkins and Thomas, 2002; Borensztein, 1998).

Technology: FDI is important for productivity and sustainable economic growth due to transfer of knowledge, skills and enhancement of Research and Development (R&D) efforts in the host countries (UNCTAD, 2010).

Managerial capacity: Following Lall and Streeten (1977), FDI leads to more efficient management of operations due to better training.

(b) Employment Generation – FDI leads to both direct and indirect increase in employment, wherein the direct employment refers to the increase in employment in the host enterprise and the indirect employment refers to increase in employment in the firms that supply supporting materials. Aaron (1999) estimated that FDI directly created about 26 million jobs in the developing world and for every direct job created, 1.6 jobs were created in the allied sectors.

(c) Effect on the Balance of Payments (BoP) Account – There are three channels through which FDI affects BoP account: MNE buying a subsidiary firm leads to a one-time influx in the capital account of host country, if FDI has an import substitution effect, it improves the current account of the host country, and lastly, if the good produced by the host enterprise is exported and sold in other countries, then also it positively affects the current account of the host country.

(d) Effect on Competition – FDI increases economic growth by raising domestic competition which leads to investment in newer technology and R&D, in turn leading to higher productivity and better prices (OECD, 2002).

The FDI-trade nexus created by the GVCs have spliced and spread the various stages of the production process across different countries, called as production fragmentation in literature, and this has led to increasing complementarity between cross-country FDI and trade flows (World Bank). This also has important implications on the effect of macroeconomic crises on trade flows between countries. If a commodity is produced entirely within the exporting country and there is a fall in demand, it leads to the disruption in this unidirectional trade flow. But if this commodity is produced using an imported commodity as an intermediate good, the fall in demand leads to disruption of these two directions of trade flows. O'Rourke, 2009 argues that since GVCs cause more trade, a 1 percent reduction in demand cause a 1 percent reduction in trade of both intermediaries and final goods. This implies that a reduction in demand for goods now impacts more countries operating as part of a GVC. Ferrantino and Taglioni, 2014 comment that since the demand for final good feeds into the demand for intermediate goods which are spread out across many countries mean that the demand shocks in times of economic crises are more rapidly and fully transmitted across countries.

To analyze the impact of macroeconomic crises on this FDI-trade nexus, this paper focuses on the relationship of 36 countries – between the 31 developed OECD countries with 5 developing BRICS over the period 1986-2013, covering three macroeconomic crises – the Mexican Peso crisis of 1994-1995, the "contagion" Asian crisis leading up to Russian Ruble and Brazil crisis from 1997-1999, and the 2008 Global Financial Crisis. The paper argues that due to increased uncertainty, the transaction costs rise during periods of crises which dampens the cross-country trade-FDI interlinkages. While the Mexican Peso crisis does not have a significant effect on the FDI-trade relationship and the Asian crisis indicates an increase in these interlinkages which are contradictory to the underlying assumption, the paper thereafter focuses solely on the Global

Financial Crisis.

The results indicate a robust positive effect of bilateral trade on bilateral FDI flows between country pairs, wherein a 1 percent increase in trade leads to a 0.8 percent increase in FDI on an average, ceteris paribus which is significant at 1 percent level. Furthermore, not only is a significant bidirectional Granger causality established- running both from trade to FDI and from FDI to trade over the sample period, it is also augmented by significant instantaneous feedbacks between the FDI and trade flows. Interestingly, the 2008 crisis period displays a significant reduction in the impact of trade on FDI flows as a 1 percent increase in trade flows leads to an average increase in FDI flows by 0.60 percent, with the reduction being significant at 5 percent. This negative impact of the crisis period is more pronounced for the fixed effects approach- wherein the 1 percent increase in trade leading to a 0.26 percent increase in FDI is dwarfed by the negative effect of 0.32 percent due to crisis, giving an overall negative impact of 0.06 percent of trade on FDI during the crisis period. This result is reflected in analysis of Granger causality which show a break in causality running from FDI to trade during the crisis period, i.e. results indicate that the bilateral FDI flows do not have a significant impact on the trade flows between countries during the crisis period. This may be because of the relative stickiness of FDI flows which make the countries resort to reducing the intensity of cross-country trade relationship in periods of increased uncertainty and risk perception.

II. THEORECTICAL MOTIVATION

The theoretical foundation of this paper rests on the discussion in Hosseini,1994 which argues that economic theory took a long time evolving into something that could explain the motivation behind FDI. It sketches its history starting from the classical world of perfect competition, homogenous commodities and costless information wherein there was no need for prices to deviate

from their equilibrium or any economies of scale to be harnessed by marketing or by setting up globally dispersed production and distribution channels. This was followed by the Hecksher-Ohlin-Samuelson model which postulated only trade in goods between regions and argued that the trade in goods would lead to an equalization in the factor prices and hence, the search for a theoretical backing continued.

The first theory about transfer of capital from one place to another was that of portfolio theory, which explained this movement in search for higher profits, due to interest rate differentials. This theory however, lacked an explanation for transfer of knowledge in terms of technology or managerial capacity, which was one of the mainstay features of FDI. It was only after the Coase-Williamson theory of transaction costs that the FDI flows between countries could be explained. Transactions costs refer to the cost incurred in an economic transaction other than the price paid for in the exchange, i.e. it refers to all the costs which are not accounted for in the financial price of the product or service. Transaction costs constitute of information, bargaining and policing costs (Dahlman, 1979), each of which are defined as follows:

1. Information costs exists due to imperfect information, which are bound to be higher across countries. This refers to the costs incurred for searching about the best production techniques, access to resources, preferences in the market, et cetra form the producers' perspective and costs associated with matching preferences with the best priced product for the consumers.
2. Bargaining and negotiation costs refer to reaching a mutually beneficial agreement between parties. In as much as languages and cultures differ across countries, it will increase these costs.
3. Contract enforcement or policing costs: These refer to the costs associated with keeping the contract and the agreed upon conditions enforced when the formal institutions and policing frameworks do not exist (perfectly).

This theory however, had the drawback of not taking account the political uncertainties which were crucial in determining the direction and magnitude of FDI flows. Hosseini (1994) further argued that even when FDI was motivated by revenue considerations, there was an element of political uncertainty and the perception of risk which shaped the FDI decision. This argument, being an extension of transaction cost theory to incorporate risk, implied that FDI might not flow as per raw economic logic. Moreover, since risk perception depended on both the access to local information about the host country which may be inaccurate and was subjected to the receivers' ability to evaluate that information for decision making with limited time, (as per Herbert, 1982), FDI decision could be categorized as bounded rationality (Hossieni, 1994).

The interlinkages between FDI and trade flows could then be regarded as a consequence of bilateral trade relationship affecting transaction costs between countries. The body of literature concerning the reduction in cross-country transaction costs emphasize on "network effects" which are proxied by business and social connections, and information and communication technology shared between countries. Murat et al. (2006) conclude that "entry (in terms of FDI) is more difficult when countries are distant, not only geographically, but also culturally and institutionally" (Murat 3).

While the trade - FDI interlinkages may be regarded as developing over the long run, they rest on the foundations of transaction costs, which due to the bounded rationality argument would change with changes in the macroeconomic variables and risk perception. It becomes imperative then to study the impact of crises, as a single episode of macroeconomic crisis would have a significant impact on uncertainty and risk perceptions, both financial and political. Moreover, when the crisis is global in nature and has a contagion effect, these transaction costs are bound to rise globally. The underlying hypothesis of the paper is that while the long run FDI-trade interlinkages would

imply a positive impact of trade on FDI, an episode of crisis would increase transaction costs due to increased uncertainty and risk and hence, would tend to lower this positive impact.

III. LITERATURE REVIEW

UNCTAD defined FDI as a type of cross-border investment made in order to acquire a lasting interest in the invested enterprise. The literature specifies a nuanced relationship between FDI and trade flows - while some early studies like Blonigen (1997) and Brainard (1997) emphasize the substitutive nature of the relationship, a body of literature like Lipsey and Weiss (1981) and Blomstrom et al. (1988) provide empirical evidence suggesting complementarity in the same. Dunning (1993) however suggests that FDI may be guided by varied motives which would determine the factors affecting it as well as specify its relationship with trade. It further categorizes FDI as market seeking, revenue seeking or efficiency seeking.

- Market-seeking FDI refers to investment serving the local market, which is driven hence, primarily by the size of the market, and is categorized as horizontal FDI, which acts as a substitute to trade.
- Revenue-seeking FDI is investment driven by the abundance of resources – like labor, and is undertaken with the motive of increasing the trade wherein the produced goods are exported from the host country to be sold in rest of the world. There is a complementarity between this type of vertical FDI and trade, which is driven by the market size of the rest of the world.
- Efficiency-seeking FDI refers to gain in efficiency, due to economies of scale and scope of dispersing the production process across different countries.

Swenson (1999) reconciles these opposing forces by considering the differences in the interplay between trade and foreign direct investment at the aggregate and micro level and finds that complementarity exists at the macro level, while a substitutive relationship exists at the industry

and product level. Blonigen (2005) asserts that while the FDI flows between industrial and developing countries represent vertical FDI, horizontal FDI is what flows between industrial countries. And hence, the relationship of trade flows with FDI is complementary when considering flows between industrial and developing countries, while it is substitutive in nature when considering FDI flows between industrial countries.

The literature review is organized as follows. The papers summarizing key determinants of FDI presented in Table 1-1 followed by a discussion on the impact of trade and global integration on transactions costs and risks are used to draw implications. The purpose and contribution of this paper are then outlined.

Table 1-1: FDI Determinants: Literature Review

Direction of Correlation	GDP --> FDI	covariates --> FDI	globalization measure --> FDI	FDI --> Trade Trade --> FDI
Dependent Variable	FDI net inflows as percentage of GDP	Bilateral FDI stock, affiliate sale, cross-border M&A	FDI gross inflows as percentage of GDP	Bilateral gross FDI as a percent of GDP; bilateral trade as a percentage of GDP
Independent Variables	growth rate of GDP per capita, inflation rate regarded as an indicator of stability, log of telephone lines per 1000 people denoting infrastructure, log of labor cost per worker in manufacturing sector, degree of trade openness, a risk rating and the highest tax rate	extensive list of covariates used in standard gravity models	Global factors like average world interest rates, average world equity return, average world GDP per capita growth rate. Local factors of domestic productivity, expropriation risk and tax pressure.	Bilateral gross FDI as a percent of GDP; bilateral trade as a percentage of GDP. Extra controls: G-3 growth rates, GDP per capita, interest rate spreads of home country, democratic rule and level of corruption
Data	38 developing countries for the year 2000-2004.	OECD countries for the year 2000; Thomsen's SDC Platinum database on M&A	94 countries - 74 developing countries and 20 industrial countries over the period 1970-1999	81 countries for the period 1982-1998
Methodology	OLS in levels	Bayesian Model Averaging - which gives the impact of independent variable notwithstanding the model used	OLS in levels	Geweke's decomposition method and Granger Causality

Estimated Impact	1 unit increase in growth rate of GDP per capita increases FDI by 0.25 units.	only inclusion probabilities	A 1 unit increase in world interest rate reduces FDI/GDP by 0.13 while increase in world growth also reduces FDI/GDP by 0.11	Granger causality exists from FDI to trade (50%) and from trade to FDI (31%)
Conclusion	Market size, better infrastructure, trade openness and economic stability have positive impact on FDI.	High inclusion probabilities for traditional gravity variables, cultural distance factors, relative labor endowments, and trade agreements. Variables of trade openness, host country infrastructure, business costs, and institutions have low inclusion probability	The importance of global factors for driving FDI, both due to the direct effect of global factors on FDI as well as an indirect effect on local factors which also fed into affecting FDI	Two-way feedbacks exist between trade and FDI flows and they are stronger for developing countries vis-à-vis the developed countries.
Authors	Demirhan and Masca, 2008	Blonigen and Piger,2014	Albuqurque et al., 2005	Aizenman and Noy, 2006

The paper considers bilateral trade flows between countries as being the main variable of interest due to its interconnectedness with FDI due to the ubiquitous global production and distribution networks undertaken by the MNEs. MNEs face lower transaction costs by internalizing non-pecuniary externalities where the non-pecuniary externalities refer to market imperfections in intermediate products market (Hennart, 2000). Moreover, by turning individual market agents into employees, it reduces their incentive to cheat (Hennart, 2000). The role of the MNEs in creating the FDI-trade nexus have meant that an increase in intensity of trade relations between two countries is embedded with lower transaction costs. And a decrease in transaction costs lead to an increase in FDI (Javorcik et al., 2010; Murat et al., 2006).

However, growing global integration, both in terms of more intensive FDI and trade relations has raised doubt on its benefit, especially for the developing countries in the aftermath of the 2008 crisis. Reinhart et al. (2009) found that the capital inflows to emerging economies increased their

risk of financial and economic crisis. Even the demand shocks in times of economic crises are more rapidly and fully transmitted across countries (Ferrantino and Taglioni, 2014).

The findings in the literature survey lead to implications and necessitates further analysis which are presented as follows:

(i) Complementarity is expected between the FDI and trade flows between countries.

(ii) The consequences of macroeconomic crises are more likely to be spread across countries, and hence, it would be more global in nature.

While a positive correlation between FDI and trade is implied by the existing body of literature, an analysis of the impact of a macroeconomic crisis is lacking. This question is of increasing importance due to the ubiquitous workings of GVC. Moreover, while it is argued that MNEs lead to a greater transmission of supply shocks across countries, an analysis of whether this phenomenon leads to more temporary or permanent changes in investment and trade behavior is required.

This paper studies the FDI-trade nexus over the period of 1986-2013 and analyzes whether any deviations exist in this relationship during periods of macroeconomic crises. Furthermore, it delves into whether these changes are temporary or permanent by contrasting the FDI-trade relationship over the sub-periods of pre-crisis with crisis and post-crisis.

IV. EMPIRICAL STRATEGY

The basic empirical strategy being followed is to specify a Gravity model with bilateral trade flows being the main independent variable and bilateral FDI flows as being the dependent variable. It rests on foundations laid in Rose and Spiegel (2004). Gravity model for two countries `i' and `j' is estimated using the following specification:

$$lnFDI_{ijt} = \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt} + \varepsilon_{ijt} \quad (1)$$

where country `i' is a country from BRICS and country `j' from OECD, the level of analysis is the flows between each country in BRICS with each country in OECD. FDI_{ijt} is the sum of absolute value of FDI inflows and absolute value of outflows between the country-pair at time `t', $TRADE_{ijt}$ refers to the value of exports and imports between the country-pair at time `t', Z'_{ij} is a vector of indicator variables used as controls and constitutes of factors like common border, common language, common colonizer, whether they colonized each other, whether the country-pair includes a landlocked country or island economies. G'_{ij} is a vector of geographical variables including the distance separating the two countries in the pair, and a measure of market size represented by the product of the area of the two countries. Y'_{ijt} represents the vector for time dependent controls like the real GDP of country `i', real GDP of country `j', population for country `i', and population for country `j'.

The crises periods are modeled by introducing a dummy variable for the period of impact. The impact of crisis variable on the relationship between FDI and trade flows is then determined by adding the interactions of the dummy variable with all the explanatory variables. The basic model specification to analyze the impact of the dummy period is then given by:

$$lnFDI_{ijt} = \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt} + \lambda * dummy_c * (1 + \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt}) + \varepsilon_{ij} \quad (2)$$

The variable $dummy_c$ takes three values as c = crises considered in the analysis: Mexican crisis, the Asian crisis (including the Russian ruble crisis) and the financial crisis of 2008 and the post-2008 crisis. Hence, three dummy variables are introduced in the model with the value of unity for the years 1994-1995, 1997-1999, and 2007-2010 denoting the respective crisis, while it is zero for all other years. Likewise, the post-2008 crisis dummy is unity for the years 2011-2013 and zero otherwise. The variable of interest is the change in the trade coefficient which represents the

changing effect of trade on driving FDI flows in times of crisis. This is denoted by $dummy_c * lnTRADE_{ijt}$ with the magnitude given by $\lambda * \alpha$. A post-2008 crisis dummy is also introduced with a value of unity for the years 2011-2013 and zero otherwise, to compare the changes in the model in the pre- and post-crisis periods.

V. DATA

The data used in the estimation process is a panel data for 36 countries – 5 BRICS and 31 OECD nations spanning over the period 1986-2013. The Rose-Speigel dataset for 1986-1997 is updated until 2013, using country pair identification number from IMF International Financial Statistics (IFS). The list of countries included in the sample is presented in Table 1-3. The sample consists of data on FDI, trade and all other explanatory variables between OECD and BRICS, i.e. the sample consists of bilateral flows between each BRICS country with each OECD countries. The FDI flows between the partner countries is sourced from the OECD database with a lower bound of 1 specified on the FDI flows to minimize the bias due to missing or negative values. Moreover, the bilateral FDI flows is specified as the sum of the absolute values of inflows and outflows in USD millions. Trade flows data is taken from IMF Direction of Trade Statistics (DOTS), measured in USD millions and deflated by the US CPI, which is sourced from World Bank World Development Indicators database. Trade flows is also bilateral in nature, i.e. the trade flows is calculated as the sum of the absolute value of imports and the absolute value of exports. Data on GDP is also sourced from the World Bank Development Indicators database, and population data comes from the United Nations World Population Prospects database. The summary statistics of the data is presented in Table 1-4.

Analyzing the historical trend in the data is helpful to see any large drops or structural breaks. represents the FDI net inflows and outflows as a percentage of GDP. The historical trends show a

surge in the FDI inflows and outflows during the latter half of 1990s along with two periods of collapse in the numbers. IMF Foreign Direct Investment Trends and Statistics, 2003 reports the following:

(i) The world FDI inflows was rising at 13 percent on an average during the period 1990-1997.

(ii) The sudden increase in the period 1998-2000 was a result of largescale cross-border mergers and acquisitions.

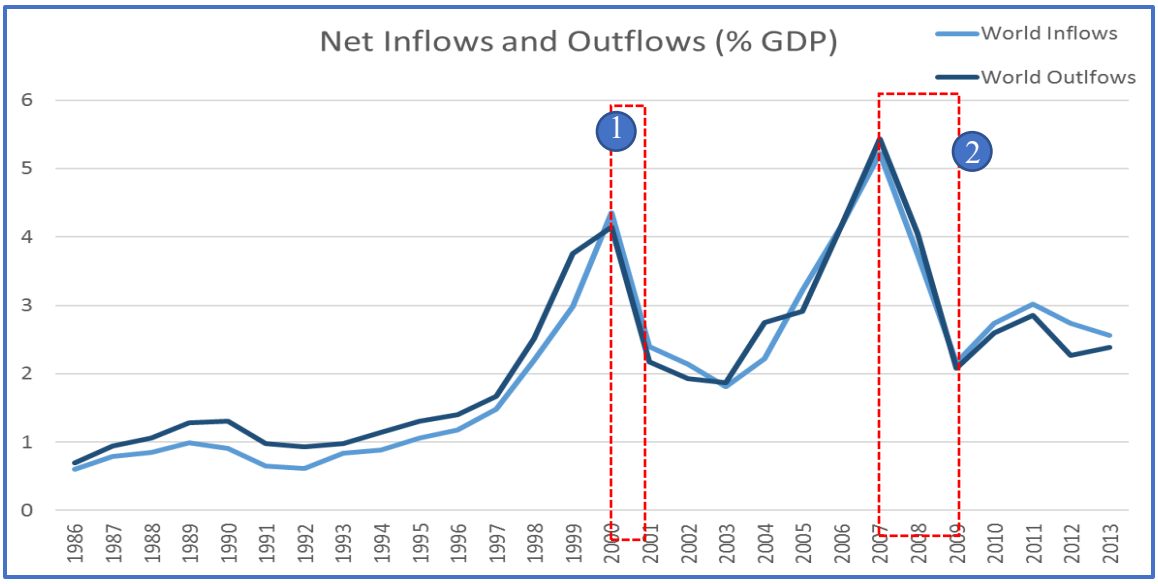
(iii) World FDI inflows in 2000 reached 1.5 trillion USD at its peak before collapsing to 0.7 trillion USD in 2001, which in turn was a result of a sharp fall in the cross-border mergers and acquisitions among the industrial countries.

The second period of contraction in FDI flows is during the period 2007-2009, falling from around 1.9 trillion USD from its peak in 2007 to plateauing at around 1.2 trillion USD in 2010 (UNCTAD,2011). This break in the trend was following a collapse in value of real estate, stock markets, consumer confidence, and of output triggered by the Global Financial Crisis of 2008.

The other periods of macroeconomic crisis in the sample, the Mexican Peso crisis of 1994-1995 and the Asian crisis followed by the Russian Ruble crisis does not seem to have an impact on the global FDI flows as the FDI continued toward a rising trend. The historical trends of FDI inflows and outflows and trade are depicted respectively in Figure 1-2,

Figure *1-3* and Figure 1-4.

Figure 1-1: World FDI Inflows and Outflows (% GDP)



While the FDI inflows and outflows as a percentage of GDP for the sample countries seem to be volatile over the years, there is a systematic fall in the period of 2007-2010. The historical movements in trade as a percentage of GDP for sample countries is very gradual and shows a fall in the crisis period under consideration of 2007-2010.

Figure 1-2: FDI Net Inflows for OECD and BRICS

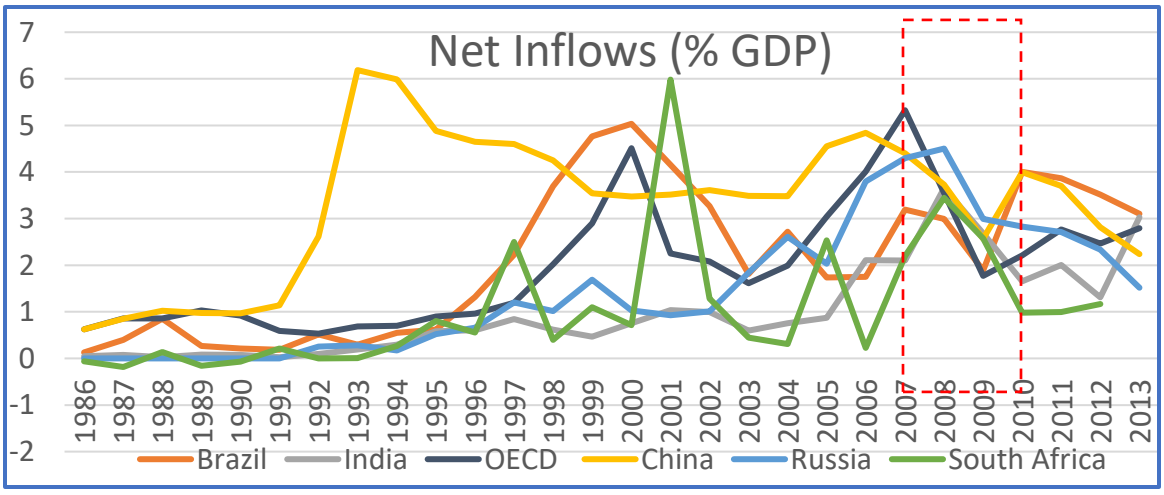


Figure 1-3: FDI Net Outflows for OECD and BRICS

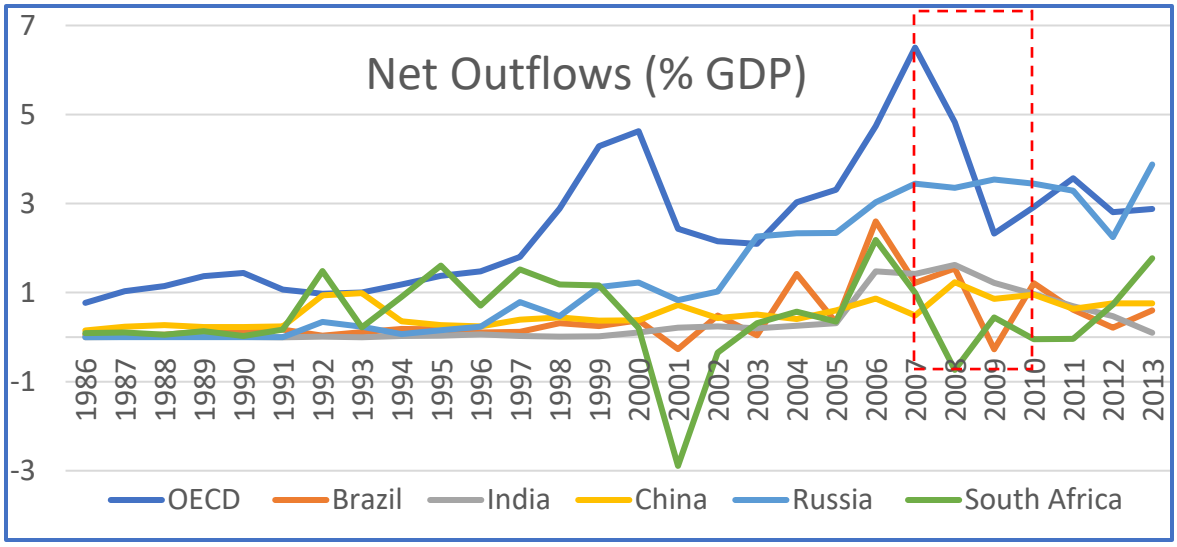
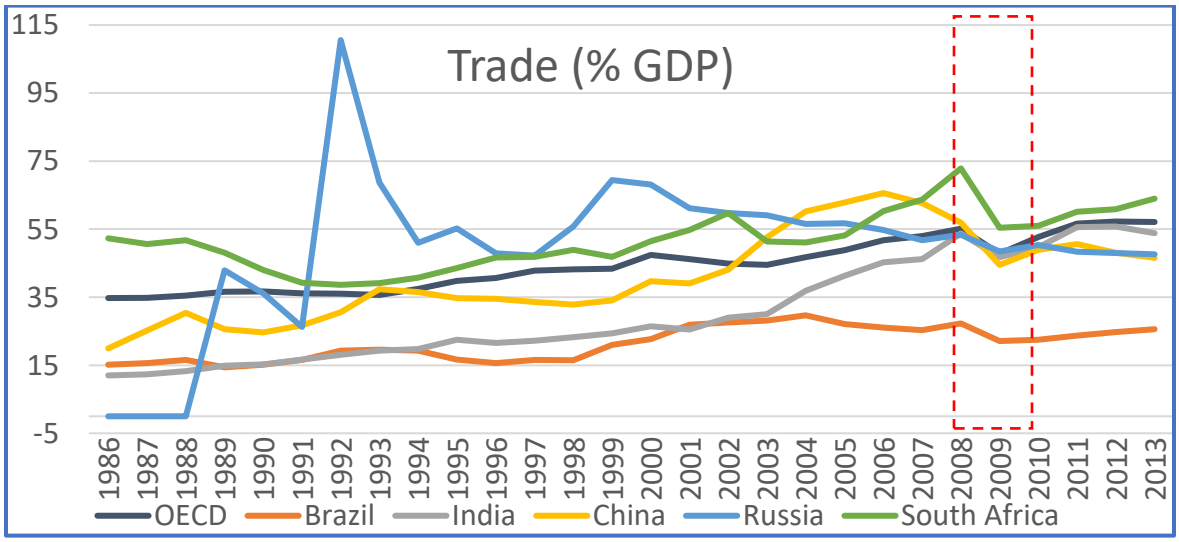


Figure 1-4: Trade for OECD and BRICS



The fall in the magnitude of FDI and trade flows weighted by GDP represent the impact of a macroeconomic exogenous shock. This shock might also affect the relationship between trade and FDI, which is analyzed next.

The correlation between the two variables – pairwise bilateral FDI and Trade weighted by the pairwise GDP is presented in Figure 1-5. Figure 1-6 depicts the same for the 2008 crisis period. The visual presentation of the data can be used to derive two conclusions:

1. Positive correlation between FDI and Trade flows: The data shows complementarity in FDI-

Trade relationship and so an increase in trade flows is expected to increase FDI flows in the country-pair. Since the sample countries have different GDP, the graphical relationship is presented between FDI-to-GDP and trade-to-GDP over time. As the sample consists of bilateral flows between the developed OECD countries and the developing BRICS countries, the data supports the conjecture of vertical or a resource-seeking FDI.

2. Flattening in the correlation during crisis period: Visual comparison of the diagrams in part (a) and (b) indicate a flattening of the relationship between the two variables in the period of crisis vis-à-vis the sample period. This flattening of the relationship may indicate that while trade has a positive impact on driving FDI flows between the partner countries, the advent of a global crisis like that of 2008 reduces its impact. So even though trade has a positive impact on FDI during the crisis period, it is significantly less positive when compared to the entire sample period.

The hypothesis following these two considerations is defined as follows: There is a positive relationship between FDI and trade flows in the sample, denoting a vertical or a resource-seeking FDI, but the strength of this interlinkage is reduced for the crisis period. So, while the overall contribution of trade in driving trade flows is expected to be positive in the crisis period, it is expected to be lower than the entire sample.

Figure 1-5 : FDI-Trade Sample Correlation

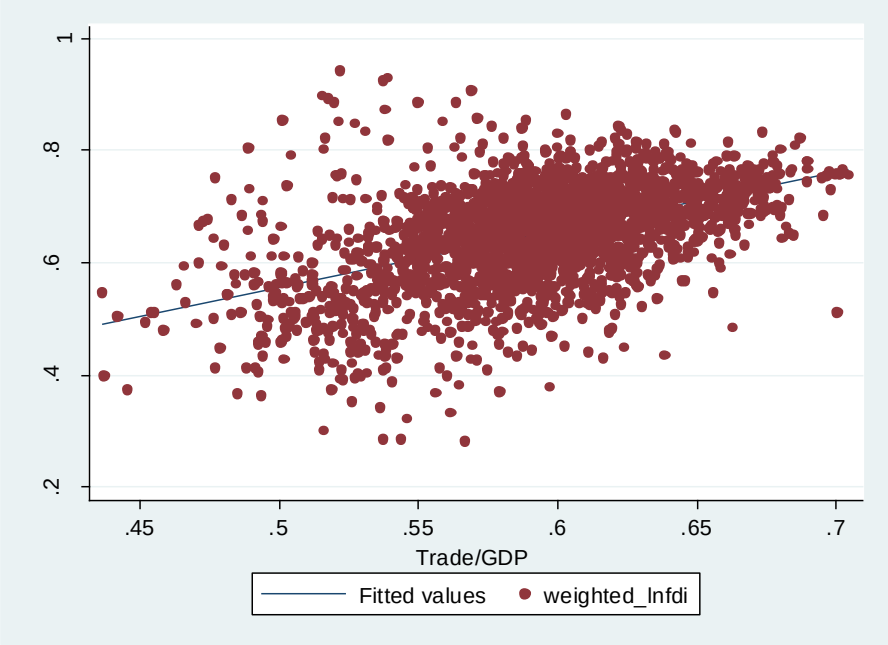
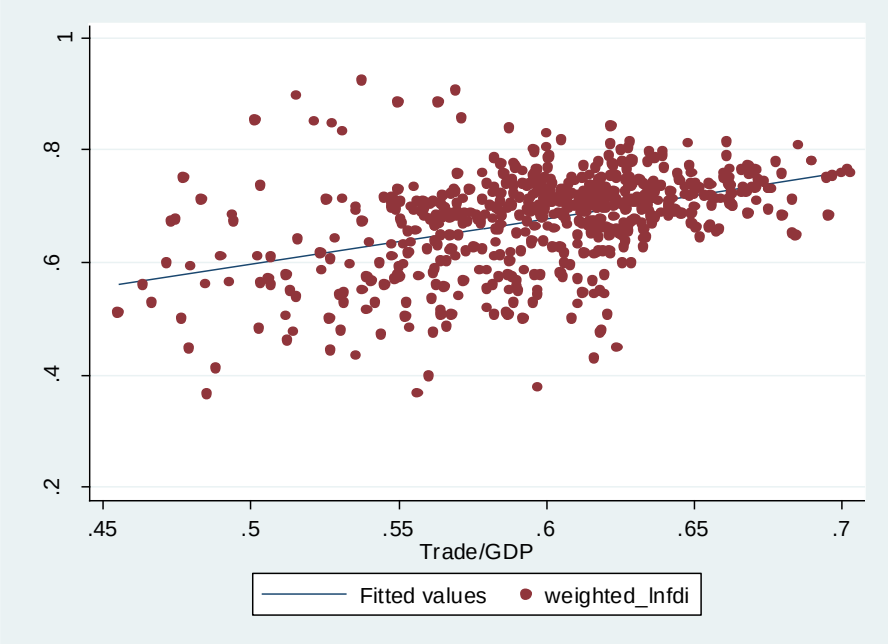


Figure 1-6: FDI-Trade Correlation during 2008 Crisis Period



The graphical depiction of data represents a positive correlation between FDI and trade flows, and hence, a positive coefficient for trade is expected. The market size variables of Gross Domestic Product (GDP) and the geographic area of the countries are also expected to have a positive impact

on FDI flows. Since FDI is dependent on economic integration, countries further away from each other are expected to interact less. Hence, variables like distance, being landlocked or an island economy is expected to lessen the FDI flowing to and from countries. Moreover, countries sharing cultural characteristics are expected to have higher FDI flows, and so variables of a shared border, common language, common colonizer and whether the countries in the pair colonized each other are expected to have positive coefficients. The hypothesized coefficient signs and the rationale is presented in the following Table 1-2:

Table 1-2: Hypothesized Effect of Explanatory Variables

Dependent Variable : FDI		
Explanatory Variable	Hypothesized Coeff Sign	Reason
Trade		Since the sample consists of flows between developed and developing countries, FDI is motivated by revenue/resource consideration. Expected to increase trade.
Distance Landlocked Island		The geographical variables of distance, being landlocked and being an island economy represent being isolated from the rest of the world, which is expected to lead to a decrease in FDI inflows and outflows.
Common border Common language Common colonizer Colonized each other		Historical accidents like having a shared border, language and colonial experiences leads to similarities in social constructs and similarity in institutions and cultural fabric. This is expected to increase trust and understanding among countries, leading to an increased bilateral FDI flows.
GDP Area		Both GDP and geographic area spanned by the countries are indicators of the potential market size of the economy and hence, an increase in either of these factors are expected to increase bilateral FDI flows.

VI. METHODOLOGY

Various empirical methodologies along with a discussion of potential biases are utilized in estimating the log-linear model specified in (1) and (2) for sample and crisis sub-periods. Each methodology incorporates country `i', country `j' and year fixed effects to control for factors specific to any individual country and year that may bias the regression results.

Ordinary Least Squares (OLS): A basic relationship between FDI and trade is estimated using OLS methodology. The results show a significant positive impact of the trade variable on the FDI flows.

Instrumental Variable (IV) Approach: The OLS model results may be biased due to potential endogeneity. The bilateral trade variable may be endogenously determined due to common factors affecting both bilateral trade and FDI flows between the country-pairs or due to the presence of two-way intertemporal linkages between trade and FDI flows found in literature.

The potential endogeneity in the model is accounted for by an attempt to instrument for the endogenous trade variable with the use of two instruments – the product of population of the two countries in the pair, and the sum of the bilateral immigration.

Bilateral immigration is used because it facilitates bilateral trade flows through two channels – first, due to the preference effect as immigrants are more likely to consume goods from the home country giving impetus to trade, and secondly, due to the network effects which lowers the information cost of doing business with the partner country (Jansen et al., 2009). Population is used as an indicator as a measure of the market size, as more people lead to higher consumption and hence, a higher demand for imports. The validity of the two instruments is tested using first-stage test, test of endogeneity using the Durbin test and Wu-Hausmann test, and a test for overidentification using Sargan and Basmann tests.

While the instruments pass these tests, the two variables of immigration and population are also correlated with the dependent variable, which is significant for FDI at 10 percent even after controlling for all other variables. These instruments therefore, are not valid as the underlying assumption of being uncorrelated with the dependent variable is violated. This method is therefore biased and causality cannot be concluded.

Generalized Method of Moments (GMM): GMM is another approach that can be used to instrument the endogenous explanatory variable. The trade variable lagged by one-period is used as an instrument. The results show a significant positive impact of trade flows on promoting bilateral FDI.

Fixed Effects (FE): Along with the country and year fixed effects, the fixed effects approach also controls for the individual country-pair factors which might affect the relationship. This approach is the most robust attempt to check the significance of trade as an explanatory variable. The results show a significant positive coefficient for the trade variable.

Granger Causality: The above-mentioned models indicate a significant (negative) impact of the 2008 crisis on the FDI-trade relationship. Predictive causality is therefore, tested using Granger Causality method. Trade is said to Granger cause FDI if trade and lags of trade have significant explanatory power even after the lags of FDI is controlled for. Moreover, Geweke's decomposition of Granger causality is helpful in deconstructing the whole impact into bi-directional linear feedbacks between trade and FDI as well as instantaneous ones. The impact of crisis then, could be decomposed into the bidirectional linear impacts as well as instantaneous impact.

VII. RESULTS

The results obtained by estimating (1) and (2) using the Ordinary Least Squares (OLS) methodology are presented in Table 1-5. Column (a) represent the results taking the entire dataset,

column (b)-(d) represent results for the Mexican, Asian and 2008 crisis respectively, while column (e) show the results for the post-2008 crisis period. The results indicate that an increase in bilateral trade flows between the country-pair by 1 percent increases bilateral FDI flows by about 0.82 percent, ceteris paribus and this is significant at 1 percent level. Comparing the impact of the three crises, the financial crisis of 2008 seems to be the only one having a significant negative effect. In period of Global Financial Crisis of 2008, this overall effect is reduced to 0.63 percent. In the crisis period, therefore, the impact of trade in driving FDI is reduced by about 30 percent and is significant at 5 percent level. This reduction in impact however, loses its significance after 3 years following the crisis marking a recovery in FDI-trade to the baseline relationship. Even while the other two crises in the sample period seem to be important for the countries of impact, the Mexican crisis does not show a significant effect at the level of analysis so considered, while the Asian crisis seem to have a positive impact on this relationship which contradicts the basic transaction theory framework. The inconsistent impacts of the two crises can be reconciled due to their being more regional in nature, as in the case of Mexican Crisis, and due to the absence of crisis epicenters from the data considered, like Indonesia, Hong Kong et cetra, as in the case for the Asian Crisis. Due to these considerations, all other approaches henceforth, only incorporate the dummy variable for the 2008 crisis.

The OLS results however, are likely to be biased due to potential endogeneity in the model. Following the two-way linkages discussed in literature, an instrumental variable approach is utilized next. Two instruments are used to proxy for the logarithmic trade flows – logarithmic sum of bilateral migration between the country pair; and the logarithmic product of the population of the two countries. The results presented in Table 1-6 indicate the baseline coefficient of trade increasing to 2.1, so an increase in immigration and population by 1 percent increases FDI flows

by 2.1 percent. This estimation approach shows a negative effect both during crisis and post-crisis period but this effect is not significant. However, as noted earlier, this approach is biased given the correlation between instruments and the dependent variable and so there is only limited inference that can be drawn by these estimates.

The bias caused due to presence of endogenous explanatory variables is also accounted for by utilizing the Generalized Method of Moments approach with the trade variable lagged by one period being used as the proxy variable, with the results given in Table 1-7. The results give a baseline coefficient of 1.1 which in the crisis period reduced by 0.33, which is significant at 1 percent level. During the crisis period, then, an increase in bilateral trade by 1 percent increases bilateral FDI in the following period by just about 0.7 percent. This reduction in impact again gets restored three years following the crisis.

Fixed effects approach is also utilized in Table 1-8 to check the robustness of the finding. The results indicate a baseline coefficient on the bilateral trade variable of 0.28, so an increase in trade by 1 percent leads to an increase in FDI by 0.28, significant at 1 percent. The impact of crisis is overwhelmingly negative, as during crisis trade has a negative coefficient of 0.32, which means that overall a 1 percent increase in trade leads to a fall in FDI by 6 percent during times of crisis.

Granger causality is tested next. Since it assumes the underlying variables to be stationary, stationarity is tested and confirmed for both FDI and trade using the Fisher test based on the Augmented Dickey-Fuller test. The p-values for the stationarity test are given in the Table 1-9. The test is conducted again for crisis and non-crisis periods. The results conclude that the two variables of FDI and trade are stationary, for the entire sample period and when the crisis and the non-crisis periods are considered individually. Granger causality test conclude that bilateral trade Granger causes bilateral FDI as well as bilateral FDI Granger causes bilateral trade in the sample,

with a p-value of 0.00 for both the cases. Geweke's decomposition in Table 1-10 and Table 1-11 respectively, show results for the entire sample and the 2008 crisis period from 2007-2010. This method decomposes the total correlation between trade and FDI into bidirectional and instantaneous feedbacks. The results show significant linear bidirectional feedbacks from FDI to trade and trade to FDI during the sample period and significant instantaneous feedback between the two. While the feedbacks in the direction from trade to FDI retain their significance in the crisis period, the feedbacks running from trade to FDI do not. This implies that even though there was not any change in how the lags of trade affected FDI, the causal link from the lags of FDI stopped being an important driver for trade flows in crisis period. This may be because of the stickiness of FDI which makes its retrieval difficult even in times of crises whereas trade may be more fluid. These results may represent an increase in uncertainties and risk perceptions that dampens the FDI-trade interlinkages during periods of macroeconomic crises.

VIII. ROBUSTNESS CHECKS

The results obtained are checked for robustness by adding a control variable for trade openness, i.e. trade-to-GDP ratio for the two countries in the pair. The main findings are replicated and the results are presented in Table 1-12 for OLS, Table 1-13 for GMM, and Table 1-14 for fixed effects approach. The negative impact of crisis on the relationship remains significant at 1 percent level. This provides support to the argument of transaction costs rising during the crisis period which dampens the FDI-trade interlinkages between countries.

IX. CONCLUSION

The purpose of this paper was to establish a relationship between bilateral trade and FDI flows between BRICS and OECD over the period 1986-2013, and analyze whether the Global Financial Crisis of 2008 had an impact on the underlying relationship. A following question under

consideration was whether the crisis had a long-term implication. The paper finds that increase in bilateral trade flows have a positive impact on bilateral FDI flows between partner countries. This positive relationship is statistically significant across time periods and methodologies. The complementary relationship agrees with findings established in literature. It finds furthermore, that the 2008 crisis had a dampening impact on this relationship – an increase in trade flows still positively impacts FDI flows but the magnitude of this impact is reduced by about 30 percent. Both the complementary relationship between trade and FDI as well as the reduction of impact rests on transaction costs argument. An increase in bilateral trade between countries reduces the transaction costs which enhances FDI flows between them. An advent of a macroeconomic crisis raises the level of uncertainty and risk perceptions, thereby increasing the transaction costs overall, which in turn dampens the positive impact of trade on FDI flows. This result Geweke's decomposition to Granger causality presents bi-directional Granger causality between trade and FDI flows in the sample period. The dampening of the relationship during the crisis period is a result of a break in Granger causality running from FDI to trade. The estimates however, suggest that the adverse impact of the crisis on FDI-trade relationship is short lived. The negative impact of crisis loses statistical significance 3 years after the advent.

The paper contributes towards understanding the investment-trade interlinkages in a highly integrated MNE-led world, mired with increased vulnerability to macroeconomic risks. It also necessitates further analysis of the impact of crisis on the health of individual economies, in terms of GDP, balance of payments, employment base. The individual country perspective is explored by analyzing the relationship between trade and FDI outflows and the potentially differential impact of the 2008 crisis on the same, which is the focus of the next chapter.

A future endeavor consists of taking the theoretical argument of transaction costs and analyzing

their impact empirically. That consists of taking global measures of uncertainty and risk perceptions, like the VIX index in the U.S. and checking for their explanatory power. A measure of depth of the crisis experienced by countries, in terms of fall in output or equity value may also provide valuable insights.

X. APPENDIX

Table 1-3: List of Countries in Sample

OECD	
Australia	South Korea
Austria	Luxembourg
Belgium	Netherlands
Czech Republic	New Zealand
Denmark	Norway
Estonia	Poland
Finland	Portugal
France	Slovak Republic
Germany	Slovenia
Greece	Spain
Hungary	Sweden
Iceland	Switzerland
Ireland	
Israel	BRICS
Italy	Brazil
Japan	Russia
Turkey	India
United Kingdom	China
United States	South Africa

Table 1-4: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
YEAR	4,340	1999.5	8.078678	1986	2013
FDIflows	4,340	342.05	1201.61	0.00	23022.52
Country1	4,340	332.67	318.69	111.00	964.00
Country2	4,340	560.40	318.82	199.00	924.00
pairid	4,340	8215.56	8571.59	794.00	32204.00
landlocked	4,333	0.19	0.40	0	1
island	4,333	0.13	0.34	0	1
common border	4,333	0.03	0.16	0	1
common language	4,333	0.11	0.31	0	1
common colonizer	4,333	0.01	0.11	0	1
colonized each other	4,333	0.03	0.16	0	1
logTRADEij	3,550	15.58	2.06	7.79	21.52
logAREAij	4,317	27.46	1.86	21.87	32.73
logDISTANCEij	4,317	8.45	0.32	7.14	9.26
logFDIij	2,474	17.76	2.84	6.91	23.86
GDPij	4,340	1630000000000	5380000000000	0	121000000000000
Pop2	4,340	529000000	511000000	32100000	1360000000
Pop1	4,340	32400000	53900000	243180	316000000
GDP1	4,340	1102731	2322113	0	15800000
GDP2	4,340	1361765	1322799	0	7672448

Table 1-5: OLS Results - Bilateral FDI

	OLS1 Sample period logFDIij	OLS2 Mexican crisis (1994-95) logFDIij	OLS3 Asian crisis (1997-99) logFDIij	OLS4 2008 crisis (2007-10) logFDIij	OLS5 Post-2008 crisis (2011-13) logFDIij
logTRADEij	0.821*** (6.81)	0.826*** (6.76)	0.798*** (6.75)	0.876*** (7.09)	0.808*** (6.64)
landlocked	-0.208 (--0.37)	-0.179 (-0.32)	-0.296 (-0.53)	-0.458 (-0.79)	-0.298 (-0.52)
island	omitted	omitted	omitted	omitted	omitted
common border	-0.224 (-0.46)	-1.411* (-1.77)	0.721 (-1.18)	0.169 (0.32)	-0.371 (-0.61)
common language	0.323 (1.40)	0.924*** (2.92)	1.105*** (2.79)	0.253 (0.91)	0.321 (1.11)
common colonizer	2.198* (1.82)	2.107* (1.78)	2.175* (1.85)	1.209 (0.80)	1.218 (1.51)
colonized each other	0.860 (1.97)	0.534 (1.14)	0.645 (0.80)	0.634 (1.44)	0.449 (0.95)
logAREAij	omitted	omitted	omitted	omitted	omitted
logDISTANCEij	-0.955*** (-2.76)	-0.920*** (-2.65)	-1.016*** (-2.83)	-0.801** (-2.33)	-0.912*** (-2.59)
logGDP1	0.099 (0.35)	-0.084 (-0.30)	-0.079 (-0.29)	-0.169 (-0.62)	-0.132 (-0.48)
logGDP2	-0.122 (-0.45)	-0.105 (-0.39)	-0.127 (-0.48)	-0.128 (-0.49)	-0.148 (-0.55)
dummy		omitted	omitted	omitted	omitted

TRADE* dummy		-0.095 (0.55)	0.276* (1.97)	-0.245** (-2.37)	0.034 (0.31)
landlocked*dummy		-0.325 (-0.73)	-0.351 (-1.27)	0.487** (2.18)	0.321 (1.27)
island*dummy		0.441* (1.75)	0.003 (0.01)	-0.390 (-1.46)	-0.408 (-1.52)
common border*dummy		1.330 (1.35)	0.522 (1.02)	-0.564 (-1.44)	0.156 (0.31)
common language*dummy		-0.642** (-2.24)	-0.879** (-2.40)	0.077 (0.36)	0.009 (0.04)
common colonizer*dummy		omitted	omitted	1.523*** (2.70)	1.404** (2.18)
colonized each other*dummy		0.346 (0.63)	0.241 (0.38)	0.285 (0.71)	0.463 (0.84)
logAREAij*dummy		-0.078 (-0.86)	-0.242*** (-3.35)	0.179*** (2.81)	0.025 (0.37)
logDISTANCEij*dummy		-0.481 (-1.48)	0.601** (2.23)	-0.713** (-2.48)	-0.462 (-1.60)
logGDP1*dummy		0.119 (0.62)	-0.157 (-0.94)	0.078 (0.57)	-0.034 (-0.23)
logGDP2*dummy		0.249 (1.32)	0.385** (2.30)	-0.087 (-0.81)	-0.042 (-0.36)
constant	14.494** (1.97)	13.71* (1.87)	15.27** (2.05)	13.319* (1.88)	15.17** (2.07)
R-squared (%)	75.01	75.20	75.48	75.61	75.22
N	2,461	2,461	2,461	2,461	2,461

Table 1-6: IV Results - Bilateral FDI

	IV1 Sample period logFDIij	IV2 2008 crisis (2007-10) logFDIij	IV3 Post-2008 crisis (2011-13) logFDIij
logTRADEij	2.099*** (9.61)	2.087*** (2.66)	2.129*** (9.67)
TRADE*d_08		-0.393 (-1.15)	-0.214 (-0.45)
constant	-90.194 (-1.51)	-106.729** (-1.84)	-95.575* (-1.60)
R-squared (%)	65.43	67.79	65.66
N	1,219	1,219	1,219
First-stage			
Partial R-squared	0.128	0.141	0.138
Prob>F	0.000		
Eigenvalue statistic	85.204	31.371	29.244
Endogenous Test			
Durbin P-value	0.000	0.000	0.000
Wu-Hausman P-value	0.000	0.000	0.000
Overidentification Test			
Sargan P-value	0.773	0.928	0.761
Basmann P-value	0.779	0.933	0.774

Table 1-7: GMM Results - Bilateral FDI

	GMM1 Sample period logFDIij	GMM2 2008 crisis period (2007-10) logFDIij	GMM3 Post-2008 crisis period (2011-13) logFDIij
logTRADEij	1.004*** (21.27)	1.069*** (20.32)	1.002*** (19.97)
dummy		2.707 (0.94)	2.624 (0.70)
TRADE*d_08		-0.328*** (-3.02)	-0.115 (-0.73)
constant	-11.828*** (-9.71)	-12.782*** (-9.45)	-12.123*** (-9.30)
N	2,439	2,439	2,439

Table 1-8: Fixed Effects Results - Bilateral FDI

	FE1 Sample period logFDIij	FE2 2008 crisis period (2007-10) logFDIij	FE3 Post-2008 crisis period (2011-13) logFDIij
logTRADEij	0.288*** (3.31)	0.264*** (3.00)	0.214** (2.42)
dummy		omitted	omitted
TRADE*d_08		-0.316*** (-4.34)	0.011 (0.12)
constant	-16.793*** (-3.58)	71.422*** (3.92)	79.195*** (4.30)
R-squared	54.30	56.04	55.13
N	2,461	2,461	2,461

Table 1-9: Stationarity tests

Test/Variable	logFDIij	logTRADEij
Augmented Dickey Fuller (ADF)	0.000	0.000
ADF for 2008 crisis period	0.000	0.000
ADF for before and after crisis period	0.000	0.000

Table 1-10: Geweke's Decomposition - Sample

Granger Causation	Chi2	df	p-value
FDI -> Trade	8.827	2	0.012
Trade -> FDI	79.715	2	0.000
Instantaneous feedback	Chi2	df	p-value
FDI <-> Trade	5.080	1	0.024
Total Correlation	Chi2	df	p-value
FDI, Trade	93.623	5	0.000

Table 1-11: Geweke's Decomposition - Crisis 2007-10

Granger Causation	Chi2	df	p-value
FDI -> Trade	0.178	2	0.915
Trade -> FDI	18.714	2	0.000
Instantaneous feedback	Chi2	df	p-value
FDI <-> Trade	4.565	1	0.033
Total Correlation	Chi2	df	p-value
FDI, Trade	23.465	5	0.000

Table 1-12: OLS with additional controls

	OLS1 Sample period	OLS2 2008 crisis period (2007-10)	OLS3 Post-2008 crisis (20011-13)
	logFDIij	logFDIij	logFDIij
logTRADEij	0.797***	0.870***	0.808***
	(6.61)	(6.98)	(6.63)
landlocked	-1.248*	-1.515**	-1.493**
	(-1.79)	(-2.20)	(-2.21)
island	omitted	omitted	omitted
common border	-0.192	0.161	-0.294
	(-0.39)	(0.30)	(-0.48)
common language	0.333	0.237	0.186
	(1.46)	(0.85)	(0.61)
common colonizer	2.215*	1.445	1.593**
	(1.92)	(0.94)	(1.98)
colonized each other	0.859**	0.795*	0.787*
	(1.97)	(1.68)	(1.78)
logAREAij	omitted	omitted	omitted
logDISTANCEij	-0.970***	-0.830**	-0.943***
	(-2.80)	(-2.41)	(-2.70)
logGDP1	0.042	-0.071	-0.025
	(0.14)	(-0.24)	(-0.08)
logGDP2	0.043	-0.010	-0.036
	(0.15)	(-0.04)	(-0.13)
trade-to-GDP of country1	0.015***	0.016***	0.017***

	(2.77)	(2.77)	(3.06)
trade-to-GDP of country2	-0.010*	-0.008*	-0.011**
	(-1.92)	(-1.67)	(-2.04)
dummy		omitted	omitted
TRADE*dummy		-0.301***	-0.104
		(-2.80)	(-0.92)
landlocked*dummy		0.434*	0.409
		(1.85)	(1.44)
island*dummy		-0.410	-0.478*
		(-1.53)	(-1.91)
common border*dummy		-0.517	0.091
		(-1.23)	(0.19)
common language*dummy		0.114	0.174
		(0.52)	(0.65)
common colonizer*dummy		1.211*	0.912
		(1.71)	(1.40)
colonized each other*dummy		0.121	0.085
		(0.31)	(0.20)
logAREAij*dummy		0.172**	0.027
		(2.53)	(0.29)
logDISTANCEij*dummy		-0.587**	-0.184
		(-2.11)	(-0.60)
logGDP1*dummy		0.137	0.108
		(1.00)	(0.73)
logGDP2*dummy		-0.038	0.129
		(-0.33)	(1.04)
trade-to-GDP of country1*dummy		-0.002	-0.003

		(-0.82)	(-1.31)
trade-to-GDP of country2*dummy		0.008	0.025**
		(1.22)	(2.52)
constant	11.01	10.76	12.54
	(1.44)	(1.46)	(1.62)
R-squared (%)	75.33	75.83	75.54
N	2,461	2,461	2,461

Table 1-13: GMM Results with additional controls

	GMM1 Sample period logFDIij	GMM2 2008 crisis period (2007-10) logFDIij	GMM3 Post-2008 crisis period (20011-13) logFDIij
logTRADEij	1.007*** (21.22)	1.075*** (20.05)	1.008*** (19.98)
dummy		1.238 (0.34)	-0.237 (-0.07)
TRADE*dummy		-0.268** (-2.38)	-0.104 (-0.72)
constant	-19.011*** (-14.39)	-18.572*** (-12.59)	-18.048*** (-12.70)
N	2,439	2,439	2,439

Table 1-14: FE Results with additional controls

	FE1 Sample period logFDIij	FE2 2008 crisis period (2007-10) logFDIij	FE3 Post-2008 crisis period (20011-13) logFDIij
logTRADEij	0.226*** (2.57)	0.271*** (3.05)	0.179** (2.00)
dummy		omitted	omitted
TRADE*dummy		-0.369*** (-4.60)	-0.097 (-0.95)
constant	-17.325*** (-3.55)	-14.609*** (-2.96)	62.091*** (3.26)
R-squared N	54.80 2,461	56.10 2,461	55.58 2,461

BIBLIOGRAPHY

Aaron, Carl. 1999. “The contribution of FDI to poverty alleviation.” Report, the Foreign Investment Advisory Service, Singapore.

Agiomirgianakis, George M., Dimitrios Asteriou and Kalliroi Papathoma. 2003. “The determinants of foreign direct investment: a panel data study for the OECD countries”. Department of Economics, City University London.

Aizenman, Joshua and Ilan Noy. 2006. "FDI and trade--Two-way linkages?." The Quarterly Review of Economics and Finance, Elsevier, vol. 46(3), pp. 317-337, July.

Albuquerque, Rui, Norman Loayza, and Luis Servén. 2005. “World market integration through the lens of foreign direct investment.” Journal of International Economics 66(2), pp. 267-295.

Blomström, Magnus, Robert E. Lipsey, and Ksenia Kulchycky. 1988. “US and Swedish direct investment and exports. In: Trade Policy Issues and Empirical Analysis.” University of Chicago Press, Chicago, pp. 259–297.

Blonigen, Bruce A. 1997. “In search of substitution between Foreign Production and Exports.” mimeo., University of Oregon.

Blonigen, Bruce A. 2005. “A Review of the Empirical Literature on FDI Determinants.” Atlantic Economic Journal, 2005, v33(4,Dec), pp. 383-403.

Blonigen, Bruce A. and Jeremy Piger. 2005. “Determinants of Foreign Direct Investment.” Canadian Journal of Economics/Revue canadienne d'économique 47 (3), pp. 775-812.

Borensztein, Eduardo, Jose De Gregorio and Jong-Wha Lee. 1998. “How does foreign direct investment affect economic growth?.” Journal of International Economics 45, pp. 115–135.

Brainard, Lael S. 1997. “An Empirical Assessment of the Proximity-Concentration Tradeoff between Multinational Sales and Trade”. American Economic Review, Vol. 87, no. 4, pp. 520-544.

Dahlman, Carl J. 1979. “The Problem of Externality.” The Journal of Law & Economics Vol. 22, No. 1 (Apr., 1979), pp. 141-162.

Demirhan, Erdal and Mahmut Masca. 2008. “Determinants of foreign direct investment flows to

developing countries: a cross-sectional analysis." Prague Economic Papers, 2008, vol. 2008, issue 4, pp. 356-369.

Dunning, John H. (1993). Multinational enterprises and the global economy. Wokingham, Berkshire: Addison Wesley.

Ferrantino, Michael J. and Daria Taglioni. 2014. Global value chains in the current trade slowdown. Economic premise; no. 137. Washington, DC ; World Bank Group.http://documents.worldbank.org/curated/en/971291468149948311/Global-value-chains-in-the-current-trade-slowdown

Hennart, Jean-François. 2000. "Transaction costs theory and the multinational enterprise." In C. Pitelis & R. Sugden (Eds.), The nature of the transnational firm (2nd ed.): 81-116. London: Routledge.

Hill, Charles W.L. 2000. "International Business - Competing in the Global Marketplace." University of Washington: Irwin McGraw-Hill.

Hosseini, Hamid. 1994. "FOREIGN DIRECT INVESTMENT DECISION, TRANSACTION-COST ECONOMICS AND POLITICAL UNCERTAINTY". Humanomics, Vol. 10 Issue: 1, pp. 61-82. https://doi.org/10.1108/eb018745

Javorcik, Beata, Çaglar Özden, Mariana Spatareanu and Ileana Neagu Constantinescu. 2010. "Migrant networks and foreign direct investment." Journal of Development Economics, 2011, vol. 94, issue 2, 231-241.

Jenkins, Carolyn and Lynne Thomas. 2002. "Foreign Direct Investment in Southern Africa: Determinants, Characteristics and Implications for Economic Growth and Poverty Alleviation." CSAE Working Paper, Oxford University.

Kurtishi-Kastrati, Selma. 2013. "The Effects of Foreign Direct Investments for Host Country's Economy." European Journal of Interdisciplinary Studies, 2013, Vol.5 issue 01, pp. 26-38.

Lall, Sanjaya and Paul Streeten. 1977. "Foreign Investment, Transnationals and Developing Countries." Macmillan, London.

Lipsey, Robert, and Merle Yahr Weiss. 1981. "Foreign Production and Exports in Manufacturing

Industries.” The Review of Economics and Statistics, 1981, vol. 63, issue 4, pp. 488-94.

O’Rourke, Kevin. 2009. “Collapsing Trade in a Barbie World”. http://www.irisheconomy.ie/index.php/2009/06/18/collapsing-trade-in-a-barbie-world/

OECD. 2002. “Foreign Direct Investment for Development: MAXIMISING BENEFITS, MINIMISING COSTS.” OECD, Paris.

Reinhart, Carmen M., and Kenneth S. Rogoff. 2009. "The Aftermath of Financial Crises." American Economic Review, 99(2): 466-72.

Rose, Andrew K. and Mark M. Spiegel. 2004. "A Gravity Model of Sovereign Lending: Trade, Default, and Credit," IMF Staff Papers, Palgrave Macmillan, vol. 51(s1), pages 50-63, June.

Simon, Herbert A. 1982. “Models of bounded rationality.” 2 vols. Cambridge, MA: MIT Press.

Swenson, Deborah L. 1999.“Foreign Investment and the Mediation of Trade Flows.” Review of International Economics, Volume 12, Issue 4, pp. 609–629.

UNCTAD. 2010. “World Investment Report, 2010 - Investing in a low-Carbon Economy.” New York and Geneva: United Nations.

UNCTAD. 2011. “World Investment Report, 2011- Non-equity modes of International Production and Development.” New York and Geneva: United Nations.

UNCTAD. 2013. “World Investment Report, 2013- Global Value Chains: Investment and Trade for Development.” New York and Geneva: United Nations.

Chapter 2

Outward FDI-Trade Nexus: Did the Global Financial Crisis impacted Developing Countries more severely?

I. INTRODUCTION

The FDI-trade relationship examined in the last chapter showed that bilateral trade flows between countries increases bilateral FDI flows between them. Bilateral trade flows was concluded to be a driver of FDI flows as the positive enforcement remained statistically significant across methodologies and time periods. The strength of the FDI-trade nexus however, was seen to weaken during the period of 2008 crisis. It was argued that trade flows between countries reduces transaction costs that lead to higher cross-country FDI flows, but the increased uncertainty during the crisis period dampens this impact.

The analysis discussed in the last chapter provides useful insights into the net impact of macroeconomic crises at the country-pair level. While this level of analysis may be helpful in indicating the tendencies in investment-trade behavior, it provides little information regarding the implication of the crisis for individual countries which the policy makers are concerned with, like the net outflows in FDI which may raise concerns about the balance of payments. While decreases in FDI outflows at the individual country level may not be atypical, a 10 percent reduction in global FDI outflows following the Global Financial Crisis of 2008 showed the potential level of impact of a macroeconomic downturn (Sauvant et al., 2010). The outward FDI from the developed countries reduced by 17 percent - but this level of impact was varied. While the sources of major decline were the OECD countries, many emerging markets experienced increase in FDI outflows (OECD, 2014), increasing thereby their importance as sources of FDI. This variation in effect

along with the underpinnings of FDI-trade nexus formed by the MNEs indicates that the crises may also have a varied effect on this nexus. It is imperative to therefore study the relationship between bilateral trade and outflows of FDI, specifically net FDI outflows, which is the focus of this chapter. The purpose therefore is outlined as follows:

a) Establish a relationship between trade and net FDI outflows to check whether trade enhances or inhibits net FDI outflows.
b) Analyze the impact of the Global Financial Crisis of 2008 on the relationship.
c) Contrast the findings of outflows from BRICS to OECD to that from OECD to BRICS to analyze whether the implications of crisis along with the underlying FDI-trade relationship for flows from developing to developed countries differs from developed to developing country flows.

The net FDI outflows is considered as the main dependent variable both for its benefits and risks which makes it a crucial variable to regard for the policy makers. On the positive side, outward FDI is a measure of global competitiveness, as it represents the ability of the firms to compete in the international markets (OECD, 2014). FDI outflows may have broader economic benefits and may lead to improvement in technological base, increase in exports, national income and better employment opportunities (OECD, 2006). Outward FDI from the MNEs in the emerging market economies grew at an enormous rate of roughly 83 percent from 2003-2008 (Sauvant et al., 2010). The BRIC countries have been growing in importance as sources of FDI – with outward FDI reaching a peak of $147 billion in 2008, constituting approximately 9 percent of world FDI outflows and with Russia and China ranking among the top 20 investors in that year (UNCTAD, 2010). Moreover, the outward FDI from BRICS holds unique advantages for they are motivated by strategic considerations and are not merely driven by short-term profitability (UNCTAD, 2010).

A country-specific discussion in outward FDI is provided by Sauvant et al., 2010 as follows:

- MNEs from Brazil have been undertaking outward FDI in oil, gas, metal, mining, cement, steel, food and beverages industries in line with the internationalization of Brazilian firms (UNCTAD, 2008).
- Russian MNEs immensely intensified their outward FDI efforts by investing 46 billion USD in 2007 and 52 billion USD in 2008. Their investment has been resource-seeking, motivated by search for raw materials and strategic commodities.
- Outward FDI by Indian MNEs have been focused on investing through cross-border M&A in the regions of U.S., Western Europe, Japan and Australia in knowledge intensive industries of pharmaceuticals and information technology services. In 2007, the outward FDI from India amounted to around USD 17 billion, with its stock amounting to USD 30 billion.
- The outward FDI from China more than doubled from USD 23 billion in 2007 to USD 51 billion in 2008. It has become an important investor in the resource-rich countries in Africa, Central Asia, and Latin America.

Outward FDI flows is also the considered as the main dependent variable as it is accompanied by risks for the home country which the policymakers are trying to minimize. These include a risk of reduced domestic investment and a lower increase in capital stock, a shrinkage in manufacturing jobs as producers shift their operations overseas, what is called as “hollowing out” of parts of economy, and hence, a reduction in domestic employment due to job migration. There are also the risks involved with exchange rate fluctuations and political uncertainties (UNCTAD, 2006). The UNCTAD World Investment Report, 2006 specifies the following risks associated when developing countries becomes sources of FDI:

- Outward FDI may not be beneficial to the productivity of the firms: FDI has been categorized as asset-exploiting or asset-augmenting. While asset-exploiting gives a more immediate access to market, and leads to improvements in market performance; the asset-augmenting FDI is a strategic, resource-seeking FDI which may increase the productivity in the long run depending on the capability of the firm. Hence, outward FDI may fail to be beneficial in this regard.
- Outward FDI is net financial outflows from balance of payments in the home country: This phenomenon, however, exists only in the initial phase and may reverse when the investment yield returns.
- Outward FDI financed domestically may reduce domestic investment: It may be regarded as a loss of capital that could've been used domestically. MNEs by taking the capital oversees may increase the interest rates at which firms borrow, thereby reducing domestic investment.
- Impact on employment is ambiguous: Outward FDI has both job-creating and job-substituting tendencies. The impact on employment in home country depends on the type of investment, the degree of complementarity of activities between home and host countries, and the extent to which the MNE imports intermediate goods from the home country.
- Potential adverse impact on bargaining power of domestic workers: Chau and Kanbur, 2013 shows that the productivity of the investing firm determines whether the openness to foreign investment is beneficial or harmful for the workers. If the least productive firms carry out the capital outflows, the workers experience an adverse impact; but if the most productive firms are more likely to carry out the capital outflows, the workers benefit.

The Global Financial Crisis of 2008 saw global outward FDI flows to significantly shrink with only limited recovery. While the outward FDI from the emerging market economies also experienced a downturn, the outward FDI flows from BRIC countries were more resilient and less

volatile than other countries (Andreff, 2015). In light of such considerations, the quantitative analysis discussed previously is undertaken again, with net FDI outflows as the main dependent variable. This chapter focuses first and foremost, on establishing a relationship between net FDI outflows and trade – to determine whether it is substitutive or complementary. This is followed by analyzing the impact of the Global Financial Crisis of 2008 on this relationship, which goes on to analyze whether this impact is differential for investment flows from developing to developed countries than vice-versa.

To analyze the impact of directional FDI-trade nexus from an individual country perspective, the data is divided into net FDI outflows from BRICS to OECD and from OECD to BRICS over the period 1986-2013. The Global Financial Crisis of 2008 is the only macroeconomic crisis considered for its magnitude of impact. Results suggest that the positive relationship between bilateral trade flows and net FDI outflows is diluted during the period of crisis, and this is impact ranges between 15 to 40 percent. The dampening of this positive nexus during crisis is more severe when considering the FDI outflows from BRICS to OECD than vice-versa, indicating that the negative impact experienced due to rise in transaction costs following the crisis could affect the investment-trade decisions of the developing country MNEs more severely. This result is confirmed by using the Geweke's Granger causality decomposition which shows that for flows from developing to developed countries, the crisis leads to a disruption in Granger causality; while for flows from developed to developing countries, the Granger causality loses significance only in the direction from FDI to trade flows.

The chapter is organized as follows: Section II discusses the relevant literature review – its finds and implications. Section III discusses the empirical strategy followed by description of the data sources and preliminary graphical analysis of the data in Section IV. The various methodologies

followed is discussed in Section V and then the results in Section VI. Section VII concludes the main findings and its major policy implications.

II. LITERATURE REVIEW

The existing literature is discussed to lay a foundation to the research question asked. Some of the important considerations include determinants of FDI outflows from developing countries, whether trade is a facilitator or an inhibitor to FDI outflows, and finally the impact of 2008 crisis. This section begins with discussing the takeaways from the research addressing the questions being asked, followed by summarizing the methodology utilized and ending with discussing the implications for this chapter.

Tolentino, 2010 considers the home country macroeconomic variables of trade openness, exchange rate and interest rates as drivers for FDI outflows. The underlying hypothesis is that lower interest rates leads to an increase in FDI outflows and so does an appreciation of exchange rate, by lowering the amount of real capital invested and by reducing the export competitiveness.

Banga, 2008 discusses three important drivers for Outward FDI from developing countries. These include trade-related drivers, capability drivers and domestic factors. While the conclusion indicates that both exports and imports are important drivers for FDI outflows, the effect of imports is larger, thereby implying that higher domestic competition in the home market may be a more important driver for FDI outflows than a motive of expanding market access.

Recent literature concluding a differential impact of a macroeconomic crisis include the following: Kali and Reyes, 2010 use a network based approach to show that for transmission of a macroeconomic crisis, trade can be both beneficial and harmful. The impact of the crisis is more spread when the epicenter country is better integrated in the global trading network, but the countries are also better able to dissipate the negative impact of the crisis when they are better

integrated. Grant, 2016 finds that the negative impact of the 2008 financial crisis spread across countries via two channels – proximity in trade and finance. And while bilateral trade had minor impact, similar in magnitude for both near and far countries, it was the financial interlinkages which acted as the primary channel of crisis transmission. Forbes, 2012 finds that the vulnerability of the countries to crisis was higher, higher the trade exposure, leveraged banking system, weaker the macroeconomic fundamentals and larger the international portfolio investment liabilities.

Table 2-1: Literature Review

Category	Dependent Variable	Independent Variable	Data	Methodology	Conclusion	Authors
Home country determinants of FDI outflows	Real FDI outflows in USD million	Trade openness - sum of imports and exports, home country interest rate, home country exchange rate	China for the period 1982-2006, and India over the period 1980-2006	Vector autoregressive modelling and Granger causality	Changes in the level of FDI outflows were not Granger caused by changes in the macroeconomic factors considered. FDI outflows were highly autoregressive.	Tolentino, 2010.
Trade as a driver of FDI outflows	Outward FDI	Trade related drivers - exports and imports as a percentage of GDP, membership in regional trade agreements and number of bilateral agreements signed; capability related drivers - inward FDI, education, cost of capital; and domestic factors- GDP, wages, rate of unionization, infrastructure, tax on profits	13 developing countries from East, South and South East Asia over the period 1980-2002	Fixed effects and random effects model	Trade related drivers of exports-to-GDP and imports-to-GDP significantly increase outward FDI. Other important drivers include inward FDI and secondary education enrolment rate.	Banga, 2008.
Transmission of crisis	Deviation in average stock market return	Network indicator for epicenter country and the partner country, macroeconomic variables of bank reserves to asset ratio, inflation rate, GDP growth rate, trade-to-GDP	182 countries over the period 1992-2000	Network approach is used to develop global trading system via international trade linkages	The impact of crisis (calculated by return in the stock market) is more intense if country is more integrated with the epicenter country.	Kali and Reyes, 2010.

	Equity returns	Change in commodity-price index, TED spread, change in the long-term U.S. interest rates	48 countries over the period 1980-2012	Correlation, extreme-value analysis, conditional probability regression model	Countries have become more inter-dependent over time and are more likely to experience extreme negative returns simultaneously.	Forbes, 2012.

While the effect of bilateral trade on FDI outflows based on the literature is inconclusive, with Banga (2008) finding a positive effect and Tolentino (2010) not finding any significant impact, the discussion on impact of a crisis has similar conclusions. The contradictory findings could be a result of the data sample considered, which in case of Banga is outward flows from 13 developing countries, while Tolentino only takes outflows from India and China into consideration. The discussed research implies that the negative impact of the 2008 crisis would be more pronounced for countries which are more highly integrated with trade and financial linkages to the epicenters and have weaker macroeconomic fundamentals. While helpful, this literature does not directly help in forming a hypothesis regarding flows between the developing countries of BRICS and the developed OECD as trade and financial linkages are considered only as transmission channels for crisis. Moreover, notwithstanding the existence of higher transaction costs in developing countries as established in Inadomi, 2010, no literature to the knowledge of the author, exists in analyzing whether the changes in transaction costs following a crisis is varied between developing and developed countries.

The present chapter by analyzing the differential impact of the 2008 crisis on FDI-trade nexus between the developing and the developed countries is a step in that direction. By contrasting the impact of flows from developing to developed countries with the flows from the latter to the former, it is an effort to evaluate the varied implications of such crisis. It tries to test the hypothesis that the transaction costs are not only higher for the developing countries, but the rise in transaction

costs during a macroeconomic crisis may also be higher for them, and the impact of the crisis thereby, more severe.

III. EMPIRICAL STRATEGY

The basic empirical strategy being followed is to specify a Gravity model with bilateral trade flows being the main independent variable and bilateral FDI flows as being the dependent variable. It rests on foundations laid in Rose and Spiegel (2004) paper outlining a gravity model for sovereign defaults and trade flows.

Continuing with the model specification used in Chapter – 1, Gravity model for two countries `i' and `j' is estimated as follows:

$$lnFDI_{(i \rightarrow j)\,t} = \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt} + \varepsilon_{ijt} \quad (1)$$

$$lnFDI_{(j \rightarrow i)\,t} = \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt} + \varepsilon_{ijt} \quad (2)$$

where country `i' is a country from BRICS and country `j' from OECD, the analysis in equation (1) is the FDI outflows from each country in BRICS to each country in OECD, and in equation (2) is the FDI flows from each country in OECD to each country in BRICS. All other variable definitions remain the same: $TRADE_{ijt}$ refers to the value of exports and imports between the country-pair at time `t', Z'_{ij} is a vector of indicator variables used as controls and constitutes of factors like common border, common language, common colonizer, whether they colonized each other, whether the country-pair includes a landlocked country or island economies. G'_{ij} is a vector of geographical variables including the distance separating the two countries in the pair, and a measure of market size represented by the product of the area of the two countries. Y'_{ijt} represents the vector for time dependent controls like the real GDP of country `i', real GDP of country `j', population for country `i', and population for country `j'.

The crises periods are modeled by introducing a dummy variable for the period of impact. The

impact of the crisis variable on the relationship between FDI outflows and bilateral trade flows is then determined by adding the interactions of the dummy variable with all the explanatory variables. The basic model specification to analyze the impact of the dummy period respectively for FDI flows from BRICS to OECD and then from OECD to BRICS is given by:

$$lnFDI_{(i\rightarrow j)\,t} = \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt} + \lambda * dummy_c * (1 + \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt}) + \varepsilon_{ij} \quad (3)$$

$$lnFDI_{(j\rightarrow i)\,t} = \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt} + \lambda * dummy_c * (1 + \alpha * lnTRADE_{ijt} + \beta * Z'_{ij} + \theta * lnG'_{ij} + \Upsilon * lnY'_{ijt}) + \varepsilon_{ij} \quad (4)$$

The only crisis considered in the analysis is the financial crisis of 2008. Hence, a dummy variable $dummy_c$ is introduced in the model with the value of unity for the years 2007-2010 denoting the respective crisis, while it is zero for all other years. The variable of interest is the change in the trade coefficient which represents the changing effect of trade on driving FDI flows in times of crisis. This is denoted by $dummy_c * lnTRADE_{ijt}$ with the magnitude given by $\lambda * \alpha$. A post-2008 crisis dummy is also introduced with a value of unity for the years 2011-2013 and zero otherwise, to compare the changes in the model in the pre- and post-crisis periods.

IV. DATA

The data used in the estimation process is a panel data for 36 countries – 5 BRICS and 31 OECD nations spanning over the period 1986-2013. The Rose-Speigel dataset for 1986-1997 is updated until 2013, using country pair identification number from IMF International Financial Statistics (IFS). The sample consists of data on FDI, trade and all other explanatory variables between OECD and BRICS, i.e. the sample data consists of bilateral trade flows between each BRICS country with each OECD countries. The net FDI outflows are net FDI outflows from each BRICS country to each OECD country and net FDI outflows from each OECD country to each BRICS country. The

FDI data between the partner countries is sourced from the OECD database.

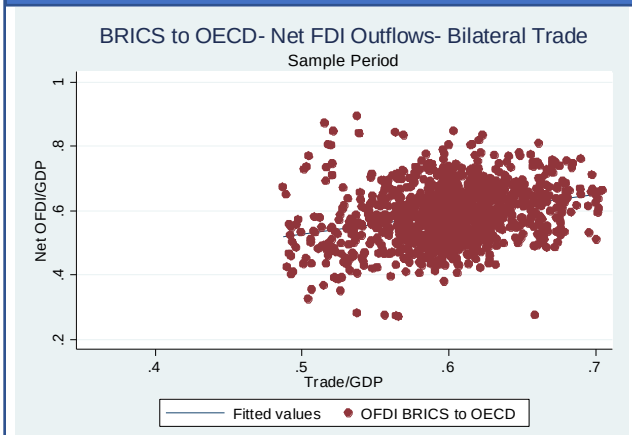
While the general historical trend is discussed in the previous chapter, the sample data is used for preliminary visual analysis. The correlation between the directional FDI flows and the bilateral trade flows is presented in Figure 2-1 and Figure 2-2. The key takeaways indicated from these figures are as follows:

1. Positive correlation exists between net FDI outflows and bilateral trade: The data shows complementarity in OFDI-Trade relationship and so an increase in trade flows is expected to increase net FDI outflows in the country-pair. Since the sample countries have different GDP, the graphical relationship is presented between FDI-to-GDP and trade-to-GDP over time. As the sample consists of directional flows between the developed OECD countries and the developing BRICS countries, the data supports the conjecture of vertical or a resource-seeking FDI.
2. Flattening in the correlation during crisis period: Visual comparison of the indicate a flattening of the relationship between the two variables in the period of crisis vis-à-vis the sample period. This indicates that while trade may have a positive impact on driving FDI outflows between the partner countries, the advent of a global crisis like that of 2008 significantly reduces its impact.
3. The flattening of correlation during crisis period is more pronounced in the case of FDI outflows from BRICS to OECD: Comparison of the graphic correlation between the sample and crisis period in Figure 2-1 and Figure 2-2 shows that the flattening is more significant when considering the net FDI outflows from BRICS to OECD countries, wherein the correlation almost seems to disappear during the crisis period. This implies that the reduction in the positive impact of bilateral trade flows is more severe when considering the net FDI

outflows from BRICS to OECD countries, indicating that the FDI-trade nexus may be more volatile for the MNEs from BRICS countries. Following the transaction costs argument then, the looming uncertainties that accompany a macroeconomic crisis may have a more severe impact on the economic decisions made by the MNEs from the developing BRICS countries.

The preliminary data analysis can therefore be used to form the following hypothesis: There is a positive correlation between bilateral trade flows and the net FDI outflows. During times of increased uncertainty, as during a macroeconomic crisis, there is a reduction in this positive trade-FDI relationship and this reduction may be more severe for the developing countries of BRICS vis-à-vis the OECD countries.

Figure 2-1: BRICS to OECD OFDI-Trade Correlation flattens significantly during the 2008 crisis



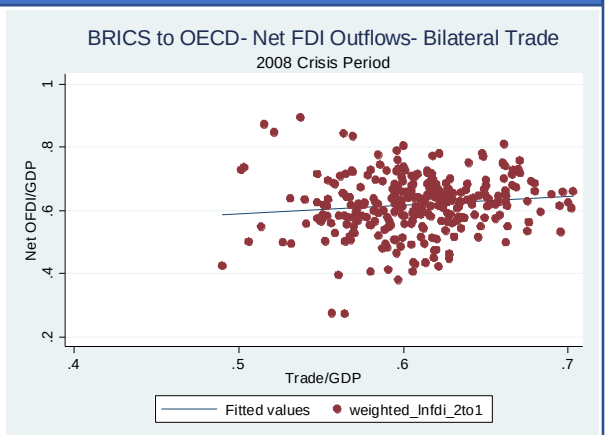
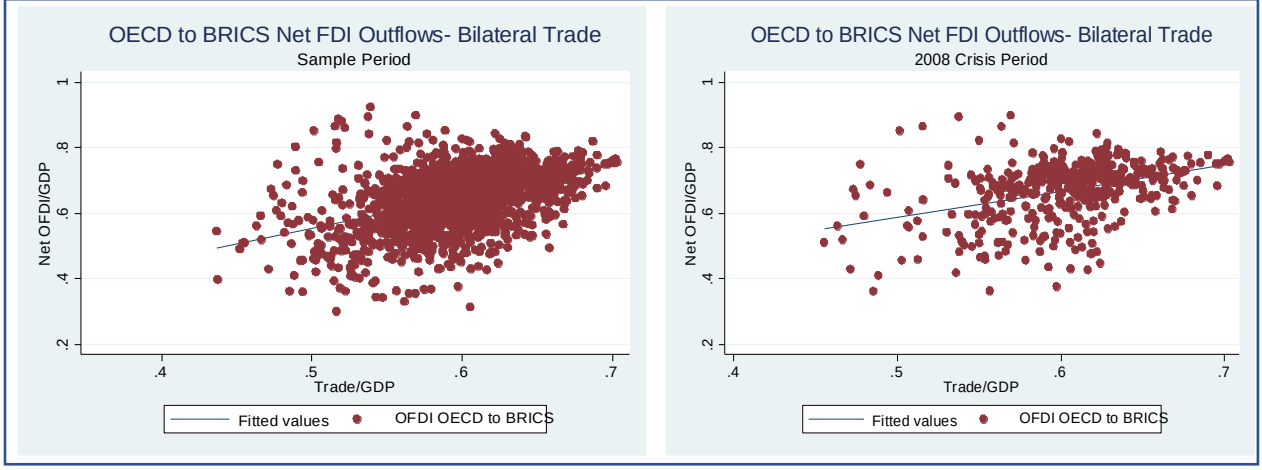


Figure 2-2: OECD to BRICS OFDI – Trade Correlation flattens significantly during the 2008 crisis



The expected signs for the other explanatory variables follow as discussed in Chapter – 1.

V. METHODOLOGY

Various empirical methodologies along with a discussion of potential biases are utilized in estimating the log-linear models specified in (1) and (2) for sample and in (3) and (4) for crisis sub-periods. Each methodology incorporates country `i' from BRICS, country `j' from OECD and year fixed effects to control for factors specific to any individual country and year that may bias the regression results.

Ordinary Least Squares (OLS): A basic relationship between net FDI outflows and trade is estimated using OLS methodology. The results show a significant positive impact of the trade variable on the FDI flows.

Instrumental Variable (IV) Approach: The OLS model results may be biased due to potential endogeneity. The bilateral trade variable may be endogenously determined due to common factors affecting both bilateral trade and FDI flows between the country-pairs or due to the presence of two-way intertemporal linkages between trade and FDI flows found in literature.

The potential endogeneity in the model is accounted for by attempting to instrument for the

endogenous trade variable with the use of two instruments – the product of population of the two countries in the pair, and the sum of the bilateral immigration.

Bilateral immigration is used because it facilitates bilateral trade flows through two channels – first, due to the preference effect as immigrants are more likely to consume goods from the home country giving impetus to trade, and secondly, due to the network effects which lowers the information cost of doing business with the partner country (Jansen et al., 2009). Population is used as an indicator as a measure of the market size, as more people lead to higher consumption and hence, a higher demand for imports. The validity of the two instruments is confirmed using first-stage test, test of endogeneity using the Durbin test and Wu-Hausmann test, and a test for overidentification using Sargan and Basmann tests.

While the instruments pass these tests, the two variables of immigration and population are also correlated with the dependent variable. These instruments therefore, are not valid as the underlying assumption of being uncorrelated with the dependent variable is violated. This method is therefore biased and causality cannot be concluded.

Generalized Method of Moments (GMM): GMM is a widely-used approach that is used to instrument for the endogenous explanatory variable with its lagged values. Since trade at time `t' is likely to be correlated with trade in lagged values, this approach is useful. The trade variable lagged by one-period is used as an instrument.

Fixed Effects (FE): Along with the country and year fixed effects, the fixed effects approach also controls for the individual country-pair factors which might affect the relationship. This approach is the most robust attempt to check the significance of trade as an explanatory variable.

Granger Causality: Geweke's decomposition of Granger causality is used to analyze the bi-directional linkages between FDI and trade. The results from the sample period are contrasted with

the results from the crisis period to analyze any changes.

VI. RESULTS

The OLS results for equations (1) and (3) are presented in Table 2-2, with column (a) showing the results for the sample period, column (b) for the crisis period considered, i.e. from 2007-2010, and column (c) showing the estimates for the post-crisis period – from years 2011-2013. The results show that on an average, a 1 percent increase in bilateral trade flows increases net FDI outflows from BRICS to OECD partner countries by 0.63 percent ceteris paribus. During the period of the 2008 crisis, however, there is a fall in this effect by 0.25 percent, so a 1 percent increase in bilateral trade during crisis period leads to a 0.4 increase in net FDI outflows.

The OLS results for equations (2) and (4) are presented in Table 2-7, with column (a) showing the results for the sample period, column (b) for the crisis period considered, i.e. from 2007-2010, and column (c) showing the estimates for the post-crisis period – from years 2011-2013. The results show that an increase in bilateral trade by 1 percent increases net FDI outflows from OECD to BRICS partner countries by 0.93 percent, ceteris paribus. The 2008 crisis period leads to a fall in this positive impact by 0.15 percent, which means that during crisis period a 1 percent increase in trade leads to an increase in net FDI outflows by 0.78 percent.

The regression result supports the preliminary finding that the reduction in the FDI-trade nexus due to crisis is more severe when considering the flows from BRICS to OECD than vice-versa. Even though the reduction in neither case is statistically significant, its sheer magnitude ranging from 15 to 30 percent, commands attention.

The regression results are estimated next using instrumental variable approach – by using the product of populations of the two countries and the bilateral immigration to proxy for potentially endogenous trade variable. The results are presented in Table 2-3 for the directional flows from

BRICS to OECD countries and estimates that an increase in bilateral trade by 1 percent increases net FDI outflows by 1.6 percent, which during times of crisis is reduced by 0.4 percent. The directional results from OECD to BRICS is presented in Table 2-8 and the estimates show that a 1 percent increase in trade leads to a rise in FDI outflows by 2.4 percent from OECD to BRICS countries, which is dampened by 0.045 during the crisis period. These estimates however, are biased due to invalidity of the instruments used.

The biases that may arise due to the instruments being correlated with the dependent are dealt with using a GMM approach which uses the trade variable lagged by one period as an instrument. The results for the same are presented in Table 2-4 and Table 2-9, respectively for the directional flows from BRICS to OECD and then from OECD to BRICS. The flows from BRICS to OECD shows the trade variable has a baseline estimate of 1.05 in sample period which is reduced by 0.4 percent during crisis period, which is significant at 5 percent. The estimated impact for directional flows from OECD to BRICS show the trade variable has a positive impact of the order 0.97 percent, which is reduced by 0.28 percent during crisis period. This reduction is significant at 5 percent. The statistical significance of this reduction disappears during the post-crisis period.

The fixed effects approach is undertaken next with results presented in Table 2-5 and Table 2-10. The results for the directional flows from BRICS to OECD show an estimated positive impact of 0.4 percent for the bilateral trade flows during the sample period is reduced by 0.35 during the crisis period. This severe reduction in the FDI-trade nexus is significant at 1 percent, which disappears in the post-crisis period. The results for the directional flows from OECD to BRICS show a positive impact of trade of the order of 0.44 percent in sample period. This is reduced by 0.18 during crisis period, with the reduction being significant at 1 percent and disappearing in the post-crisis period.

Granger causality results are presented finally in Table 2-6 for FDI flows from BRICS to OECD and in Table 2-11 for flows from OECD to BRICS. Results indicate that when considering FDI flows from BRICS to OECD countries, the only linkage that seems to matter at 10 percent significance level is that trade Granger causes FDI outflows but even this linkage loses significance during the crisis period considered. This result confirms the graphical presentation of the flat relationship between trade and outward FDI during the crisis period. The FDI outflows from OECD to BRICS, however show a strong linkage both in terms of bi-directional Granger causality between FDI and trade as well as instantaneous feedback significant at 1 percent level. The advent of crisis however renders the Granger causality in the direction from FDI to trade insignificant.

These results are in line with the earlier finding that the reduction in FDI-trade nexus during a macroeconomic crisis is more severe for the developing countries of BRICS than for the developed countries of OECD.

VII. CONCLUSION

The questions considered in the present chapter were the relationship between bilateral trade flows and net FDI outflows, how the strength of this relationship changes during periods of crisis and whether the impact of crisis was different for FDI flows from developing countries vis-à-vis the developed countries. The sample data of FDI flows between the BRICS and OECD over the period 1986-2013 showed that bilateral trade flows have a strong positive effect in driving net FDI outflows from both developing and developed countries. The Global Financial Crisis of 2008 dampened the strength of the FDI-trade relationship for both developing and developed countries as well. How the flows from the two sets of countries differed was the magnitude of the crisis impact – the correlation between trade and FDI flows seemed to reduce when considering the

outflows from OECD countries, the correlation between trade and FDI seemed to disappear for the outflows from the BRICS. This result was confirmed using various regression methodologies and Granger causality as the Granger causality from trade to FDI becomes statistically insignificant when considering the outflows from BRICS, showing a disruption in the interlinkage. The major policy implications based from this chapter are mainly dependent on the finding that bilateral trade flows enhance net outflows of FDI. Although net outflows of FDI may be beneficial depending on its motives and capabilities of MNEs, the risks associated with the same make it an important variable to keep under check. Trade integration, by driving higher FDI outflows raises these risks and hence, they can be regarded as the unintended consequences of trade. These include a potential reduction in domestic investment and a reduction in employment base at home, a worsening of the bargaining power of workers, and an initial adverse impact on the balance of payments. The Global Financial Crisis of 2008 had severe repercussions – with decreases in FDI flows, bilateral trade flows, reduction in GDP growth rate, and reduction in employment base. The impact of such risks associated with the FDI outflows then naturally become more concerning for policy makers during the depressionary tendencies marked by periods of macroeconomic crisis. It is therefore necessary to form policies that would minimize these risks some of which may include setting a minimum wage above the subsistence wage to ensure the bare necessities of the workers are met, provision of education and skill development programs to meet changing labor demands. Moreover, the strong interlinkages between trade and FDI outflows imply that investment and trade policies should be made in tandem due to their strong feedback mechanisms.

The present chapter necessitates future work focusing on the impact of a macroeconomic crisis on developing countries. A dataset spanning a larger set of countries analyzing the FDI-trade interlinkages and the differential impact of crisis on the least developed countries, the transition

economies and the emerging markets contrasted with results for developed countries may yield interesting results with important policy implications for crisis prevention and management. The experience of developing countries being more severe due to macroeconomic crises may be tested by splicing the impact of crisis in terms of reduction in output or equity values on country specific uncertainty levels.

VIII. APPENDIX

(a) Net FDI Outflows: From BRICS to OECD

Table 2-2: OLS Results: BRICS to OECD

Directional: BRICS to OECD	OLS1 Sample Period logFDIi→j	OLS2 2008 Crisis Period (2007-10) logFDIi→j	OLS3 Post-2008 Crisis Period (2011-13) logFDIi→j
logTRADEij	0.626*** (4.25)	0.664*** (4.69)	0.606*** (3.63)
landlocked	-1.779** (-2.00)	-2.374*** (-2.75)	-2.032** (-2.27)
island	omitted	omitted	omitted
common border	-2.219*** (-3.16)	-3.362*** (-3.22)	-3.449*** (-4.33)
common language	0.159 (0.45)	0.505 (1.25)	0.284 (0.51)
common colonizer	5.144*** (5.94)	5.922*** (5.17)	5.652*** (6.41)
colonized each other	2.439*** (4.66)	2.200*** (4.11)	1.562** (2.09)
logAREAij	omitted	omitted	omitted
logDISTANCEij	-1.380*** (-3.96)	-1.201*** (-3.65)	-1.319*** (-3.68)
logGDP1	0.391 (1.09)	0.314 (0.87)	0.312 (0.84)
logGDP2	0.063	0.069	-0.075

	(0.19)	(0.21)	(-0.22)
dummy		omitted	omitted
TRADE*dummy		-0.246	0.132
		(-1.52)	(0.71)
landlocked*dummy		1.338***	0.278
		(3.41)	(0.58)
island*dummy		-0.871	-0.693*
		(-1.37)	(-1.89)
common border*dummy		1.393	1.521**
		(1.10)	(2.35)
common language*dummy		-0.409	-0.140
		(-1.29)	(-0.32)
common colonizer*dummy		-1.028	-0.773
		(-0.81)	(-1.51)
colonized each other*dummy		0.299	0.947
		(0.49)	(1.14)
logAREAij*dummy		0.382***	0.067
		(3.03)	(0.64)
logDISTANCEij*dummy		-0.782*	-0.517
		(-1.68)	(-1.02)
logGDP1*dummy		0.016	-0.151
		(0.07)	(-0.74)
logGDP2*dummy		-0.158	0.073
		(-0.82)	(0.37)
constant	10.66	9.43	13.37
	(1.24)	(1.10)	(1.50)
R-squared (%)	63.26	64.65	63.67
N	1,207	1,207	1,207

Table 2-3: IV Results: BRICS to OECD

Directional: BRICS to OECD	IV1 Sample Period logFDIi→j	IV2 2008 Crisis Period (2007-10) logFDIi→j	IV3 Post-2008 Crisis Period (2011-13) logFDIi→j
logTRADEij	1.642*** (4.22)	1.632*** (4.32)	1.682*** (4.34)
dummy		omitted	omitted
TRADE*dummy		-0.474 (-0.64)	-1.009 (-1.13)
constant	-125.19** (-1.90)	-148.725** (-2.28)	-130.759** (-1.97)
R-squared (%)	53.50	56.65	54.33
N	639	639	639
First-stage			
Partial R-squared	0.105	0.123	0.116
Prob>F	0.000		
Eigenvalue statistic	34.033	7.852	9.899
Endogenous Test			
Durbin P-value	0.001	0.010	0.002
Wu-Hausman P-value	0.002	0.016	0.004
Overidentification Test			
Sargan P-value	0.279	0.312	0.070
Basmann P-value	0.304	0.355	0.094

Table 2-4: GMM Results: BRICS to OECD

Directional: BRICS to OECD	GMM1 Sample Period logFDIi→j	GMM2 2008 Crisis Period (2007-10) logFDIi→j	GMM3 Post-2008 Crisis Period (2011-13) logFDIi→j
logTRADEij	1.057*** (13.57)	1.094*** (12.52)	1.019*** (12.27)
dummy		7.707 (1.55)	6.594 (1.16)
TRADE*dummy		-0.403** (-2.26)	-0.243 (-0.99)
constant	-12.875*** (-6.31)	-13.915*** (-6.46)	-12.699*** (-5.76)
N	1,198	1,198	1,198

Table 2-5: FE Results: BRICS to OECD

Directional: BRICS to OECD	FE1 Sample Period logFDIi→j	FE2 2008 Crisis Period (2007-10) logFDIi→j	FE3 Post-2008 Crisis Period (2011-13) logFDIi→j
logTRADEij	0.379*** (2.50)	0.405*** (2.62)	0.361** (2.33)
dummy		omitted	omitted
TRADE*dummy		-0.354*** (-2.71)	0.027 (0.16)
constant	-5.42 (-0.73)	-15.94 (-0.52)	-12.87 (-0.41)
R-squared	44.23	46.93	45.26
N	1,207	1,207	1,207

Table 2-6: Geweke's Granger Decomposition: BRICS to OECD

Granger Causation: BRICS to OECD	Sample Period	Crisis Period 2007-10
FDI --> Trade	0.949	0.279
Trade --> FDI	0.083	0.347
Instantaneous feedback	0.119	0.068
Total Correlation	0.185	0.156

Table 2-7: OLS Results: OECD to BRICS

Directional: OECD to BRICS	OLS1 Sample Period	OLS2 2008 Crisis Period (2007-10)	OLS3 Post-2008 Crisis Period (2011-13)
	logFDIj→i	logFDIj→i	logFDIj→i
logTRADEij	0.937***	0.971***	0.944***
	(6.46)	(6.62)	(6.39)
landlocked	-0.397	-0.459	-0.473
	(-0.52)	(-0.62)	(-0.62)
island	omitted	omitted	omitted
common border	0.096	0.974*	0.414
	(0.19)	(1.71)	(0.62)
common language	0.571**	0.601**	0.828**
	(2.42)	(2.26)	(2.46)
common colonizer	0.143	-1.775	-0.489
	(0.14)	(-1.28)	(-0.85)

colonized each other	0.281 (0.61)	-0.019 (-0.04)	0.049 (0.09)
logAREAij	omitted	omitted	omitted
logDISTANCEij	-0.961*** (-2.69)	-0.832** (-2.35)	-0.895*** (-2.51)
logGDP1	-0.487 (-1.54)	-0.532* (-1.74)	-0.542* (-1.71)
logGDP2	-0.277 (-0.94)	-0.278 (-0.97)	-0.335 (-1.12)
dummy		omitted	omitted
TRADE*dummy		-0.156 (-1.14)	-0.101 (-0.76)
landlocked*dummy		0.283 (1.14)	0.243 (0.85)
island*dummy		-0.114 (-0.38)	-0.231 (-0.97)
common border*dummy		-1.151*** (-3.22)	-0.363 (-0.70)
common language*dummy		-0.057 (-0.28)	-0.296 (-1.01)
common colonizer*dummy		2.851*** (4.08)	0.893 (0.81)
colonized each other*dummy		0.413 (1.23)	0.268 (0.66)
logAREAij*dummy		0.133** (1.93)	-0.015 (-0.20)
logDISTANCEij*dummy		-0.615** (-2.14)	-0.538* (-1.82)

logGDP1*dummy		0.042	0.112
		(0.24)	(0.76)
logGDP2*dummy		-0.103	0.130
		(-0.77)	(0.85)
constant	20.71***	19.09***	20.99***
	(2.57)	(2.49)	(2.64)
R-squared (%)	76.43	76.79	76.50
N	1,919	1,919	1,919

Table 2-8: IV Results: OECD to BRICS

Directional: OECD to BRICS	IV1 Sample Period logFDIj→i	IV2 2008 Crisis Period (2007-10) logFDIj→i	IV3 Post-2008 Crisis Period (2011-13) logFDIj→i
logTRADEij	2.427*** (8.54)	2.366*** (8.22)	2.462*** (8.41)
dummy		omitted	omitted
TRADE*dummy		-0.045 (-0.09)	-0.341 (-0.50)
constant	56.49 (0.91)	53.38 (0.88)	49.826 (0.81)
R-squared (%)	63.83	65.35	64.26
N	965	965	965
First-stage			
Partial R-squared	0.111	0.123	0.112
Prob>F	0.000		
Eigenvalue statistic	56.35	18.44	17.78
Endogenous Test			
Durbin P-value	0.000	0.000	0.000
Wu-Hausman P-value	0.000	0.000	0.000
Overidentification Test			
Sargan P-value	0.755	0.861	0.433
Basmann P-value	0.763	0.871	0.462

Table 2-9: GMM Results: OECD to BRICS

Directional: OECD to BRICS	GMM1 Sample Period logFDIj→i	GMM2 2008 Crisis Period (2007-10) logFDIj→i	GMM3 Post-2008 Crisis Period (2011-13) logFDIj→i
logTRADEij	0.969*** (16.95)	1.026*** (15.96)	0.997*** (16.52)
dummy		3.942 (1.23)	0.345 (0.08)
TRADE*dummy		-0.284** (-2.07)	-0.268 (-1.30)
constant	-11.31*** (-8.87)	-12.38*** (-8.93)	-11.53*** (-8.42)
N	1,904	1,904	1,904

Table 2-10: FE Results: OECD to BRICS

Directional: OECD to BRICS	FE1 Sample Period logFDIj→i	FE2 2008 Crisis Period (2007-10) logFDIj→i	FE3 Post-2008 Crisis Period (2011-13) logFDIj→i
logTRADEij	0.441*** (4.35)	0.419*** (4.07)	0.437*** (4.25)
dummy		omitted	omitted
TRADE*dummy		-0.184** (-2.23)	-0.168 (-1.50)
constant	-15.39*** (-2.87)	19.67 (0.92)	21.30 (0.98)
R-squared	57.23	58.03	57.47
N	1,919	1,919	1,919

Table 2-11: Geweke's Granger Decomposition: OECD to BRICS

Granger Causation: OECD to BRICS	Sample Period	Crisis Period 2007-10
FDI --> Trade	0.009	0.749
Trade --> FDI	0.000	0.000
Instantaneous feedback	0.000	0.000
Total Correlation	0.000	0.000

BIBLIOGRAPHY

Andreff, Wladimir. 2015. “Outward Foreign Direct Investment from BRIC countries: Comparing strategies of Brazilian, Russian, Indian and Chinese multinational companies.” The European Journal of Comparative Economics, Vol. 12, n. 2, pp. 79-131.

Banga, Rashmi. 2008. “Drivers of Outward Foreign Direct Investment from Asian Developing Economies.” Asia-Pacific Trade and Investment Review 4, pp. 195-215.

Chau, Nancy H., and Ravi Kanbur. 2013. “On Footloose Industries and Labor Disputes with Endogenous Information Asymmetry.” Review of Development Economics, Volume 17, Issue 2, pp. 319–341.

Forbes, Kristin J. 2012. “The "Big C": Identifying Contagion.” NBER Working Paper No. 18465. Cambridge, MA: National Bureau of Economic Research.

Grant, Everett. 2016. “Exposure to international crises: trade vs. financial contagion.” Globalization & Monetary Policy Institute Working Paper. No. 280.

Inadomi, Henrik M. 2010. “Independent Power Projects in Developing Countries: Legal Investment Protection and Consequences for Development.” Kluwer Law International BV, The Netherlands.

Jansen, Marion., and Roberta Piermartini. 2009. “Temporary Migration and Bilateral Trade Flows.” The World Economy, Volume 32, Issue 5, pp. 735–753.

Kali, Raja., and Javier Reyes. 2010. “Financial Contagion on the International Trade Network.” Economic Inquiry, Volume 48, Issue 4, pp. 1072–1101.

OECD. 2006. “Investment for Development: Investment Policy Co-operation with Non-OECD Economies.” https://www.oecd.org/investment/investmentfordevelopment/37576311.pdf

OECD, WTO and World Bank Group. 2014. “Global Value Chains: Challenges, Opportunities and Implications for Policy.” G20 Trade Ministers Meeting. Sydney, Australia.

Rose, Andrew K. and Mark M. Spiegel. 2004. "A Gravity Model of Sovereign Lending: Trade, Default, and Credit," IMF Staff Papers, Palgrave Macmillan, vol. 51(s1), pages 50-63, June.

Sauvant, Karl P., Wolfgang A. Maschek and Geraldine McAllister (2010). “Foreign Direct Investment from Emerging Markets: The Challenges Ahead.” New York: Palgrave Macmillan.

Tolentino, Paz E. 2010. “Home country macroeconomic factors and outward FDI of china and India.” Journal of international Management, Vol 16, pp. 102-120.

UNCTAD. 2006. “World Investment Report, 2006 - FDI from Developing and Transition Economies: Implications for Development.” New York and Geneva: United Nations.

UNCTAD. 2008. “World Investment Report, 2008 – Transnational Corporations and the Infrastructure Challenge.” New York and Geneva: United Nations.

UNCTAD. 2010. “World Investment Report, 2010 - Investing in a low-Carbon Economy.” New York and Geneva: United Nations.